VOLUME 44 • FEBRUARY 1952 • NUMBER 2

THE Journal

OF THE AMERICAN DENTAL ASSOCIATION

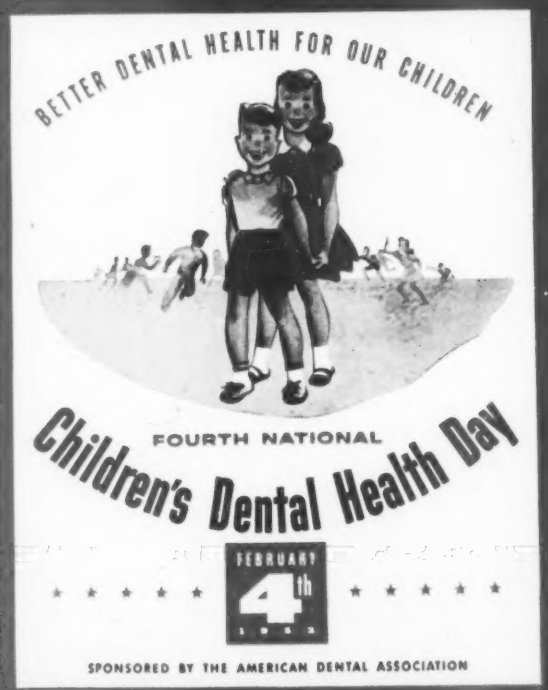

BETTER DENTAL HEALTH FOR OUR CHILDREN
FOURTH NATIONAL
Children's Dental Health Day
FEBRUARY 4th
SPONSORED BY THE AMERICAN DENTAL ASSOCIATION

TABLE OF CONTENTS ON PAGE 244

"DENTSPLY" STRIVES TO EARN AND HOLD YOUR CONFIDENCE

For many years the name "Trubyte" has been closely identified with the best in artificial teeth and with many of the new techniques, materials and instruments for prosthetic work. This pioneering spirit is still the first and daily interest of those dentists, scientists and technicians who constitute the large Research Department of the Dentists' Supply Company. Trubyte Dentron Teeth, their most recent accomplishment, is certainly a noteworthy improvement in plastic teeth.

TRUBYTE *Dentron*® TEETH

THE PLASTIC TEETH WITH 30 ADVANTAGES

ANOTHER RELI… PRODUCT O… DENTSPLY RESEA…

Announcing

National Board Examinations

April 7-8, 1952
(Applications must be received by March 8, 1952)

December 1-2, 1952
(Applications must be received by Nov. 4, 1952)

States and Agencies that recognize National Board Certificate

ALABAMA	MISSOURI
ARIZONA	NEBRASKA
CONNECTICUT	NEVADA
ILLINOIS	NEW HAMPSHIRE
INDIANA	NEW MEXICO
IOWA	OKLAHOMA
KANSAS	OREGON
KENTUCKY	PENNSYLVANIA
LOUISIANA	RHODE ISLAND
MAINE	SOUTH DAKOTA
MARYLAND	VERMONT
MASSACHUSETTS	VIRGINIA
MICHIGAN	U. S. PUBLIC HEALTH
MINNESOTA	U. S. ARMY

Circulars of information describing the National Board Examiners may be obtained by writing: Council of the National Board of Dental Examiners

AMERICAN DENTAL ASSOCIATION

222 EAST SUPERIOR ST. -:- CHICAGO 11, ILLINOIS

The Journal of the American Dental Association, Vol. 44, No. 2. Published by the American Dental Association, 222 E. Superior St., Chicago 11, Ill. Yearly subscription $7.00 for U. S. and possessions; $8.00 for foreign countries. Single copy seventy-five cents. Entered as second-class matter, December 31, 1947, at the postoffice at Chicago, Ill., under the act of March 3, 1879. Published monthly. Copyright 1952 by the American Dental Association. The Journal of the American Dental Association is indexed in the Index to Dental Literature and, in part, in the Quarterly Cumulative Index Medicus, Biological Abstracts and Chemical Abstracts.

No shelter from this shower

WITH the handy POWDALATOR Insufflator, you spray a high concentration of penicillin and sulfonamide directly into the post-extraction socket or oral wound. Infectious bacteria are quickly prevented or controlled. All you do is aim the tube and squeeze the rubber bulb.

Treatment is effective, nonirritating and less apt to cause side-effects than high systemic doses. The POWDALATOR package includes an insufflator bulb and either 20 or 100 sterile sealed tubes, each containing 5000 units of crystalline penicillin G potassium and 0.25 Gm. sulfanilamide. It is stable at room temperature for 18 months. Why not order a POWDALATOR Insufflator from your usual supplier now? Abbott

Powdalator®
INSUFFLATOR

(Abbott's Penicillin Sulfonamide Powder with Sulfanilamide in Insufflator Tubes)

proved . . . improved . . . approved

the ultimate in precise radiographic diagnosis

(short and long cone technics)

WEBER №11 RayDex

3 NEW LONG CONES

FLOOR TYPE

In Zone 1 - $ 995.00
In Zone 2 - $1015.00

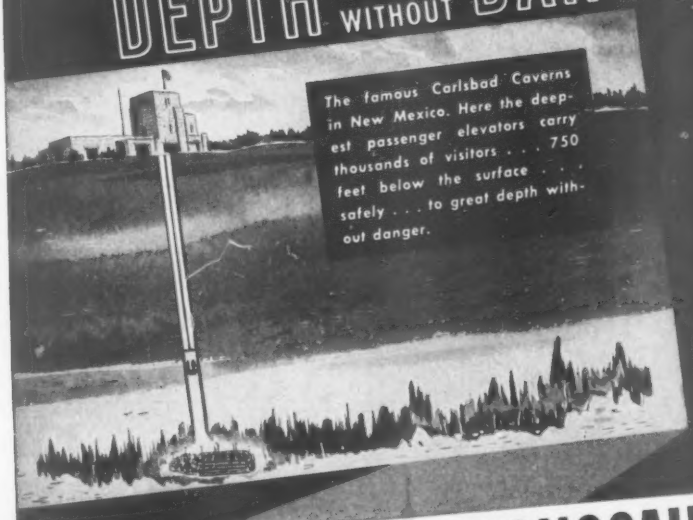
The Preferred X-Ray
. . . at the lowest cost of all!

- ***scan-a-glance***
  meter mounting for better control of X-Ray factors.
- ***longer tube life***
  Tube is capable of 15 MA at 70 KVP, but X-Ray unit is rated at 10 MA at 45 to 70 KVP.
- ***penetration control***
  permits settings of 45 to 70 KVP in definite steps of 5 KVP.
- ***exclusive Raytheon filament stabilizer***
  Improved appearance and increased capacity. Holds tube current constant within 1/20th of a milliampere. (Optional at additional cost.)
- ***exclusive single switch***
  now controls both main power line and circuit breaker.
- ***maximum definition***
  obtained by a 1 mm square focal spot—an exclusive WEBER feature.
- ***reversible timer***
  helps insure correct exposure. If set incorrectly, the timer may be reset and over-exposure thus avoided. Calibrated from 0 to 12 seconds, with ¼ second intervals.

dollar - WEBER *RayDex is the* BEST BUY

The WEBER Dental Manufacturing Co.
CANTON, OHIO and dealers *in major cities*

DEPTH WITHOUT DANGER



The famous Carlsbad Caverns in New Mexico. Here the deepest passenger elevators carry thousands of visitors . . . 750 feet below the surface . . . safely . . . to great depth without danger.

The *Safety First* LOCAL ANESTHETIC

MONOCAINE 2ME

Accepted Council on Dental Therapeutics American Dental Association

Monocaine 2ME is your assurance of *Depth Without Danger* in local anesthetic administration! Monocaine 2ME produces anesthesia as deep as a 4% procaine solution, yet its toxicity is that of 2.66% procaine. Induction of anesthesia is rapid; the anesthesia is deep, smooth and safe.

Only Monocaine 2ME offers such *depth without danger* — it combines great potency with maximum safety. *Use Monocaine 2ME in your practice!*

40 Years Novocol Service 1911-1951

Novocol CHEMICAL MFG CO., INC.
2911-23 ATLANTIC AVE., BKLYN. 7, N.Y.
Toronto • London • Buenos Aires • Rio de Janeiro

FULLY CONTROLLED EXPANSION

Interferometer readings confirm the fully controlled expansion of Odontographic Alloy for you. Therefore, to be certain of excellent results, *plus* a smooth-working amalgam that polishes to a hard, brilliant finish, use scientifically proven . . .
ODONTOGRAPHIC ALLOY.

ODONTOGRAPHIC

IMPROVED ALLOY AND MERCURY

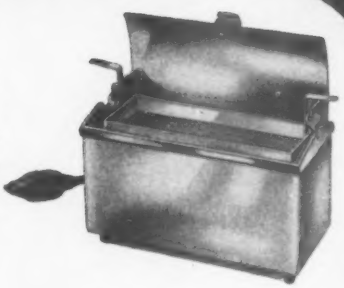
Alloy Manufacturers since 1907

ODONTOGRAPHIC MANUFACTURING CO., INC. • 62 COOPER SQUARE • NEW YORK 3, N. Y.

Meet the 8-INCH STERILIZER TWINS!

I am Model 8-0 . . .

a mighty handy and efficient unit that both sterilizes and lubricates with HOT OIL. You will find me unexcelled for dental handpieces, contra-angles, forceps, burrs, chisels, mirrors and the many allied instruments that are subject to rust or corrosive damage if repeatedly exposed to boiling water.



I am Model 8 . . .

a compact and dependable BOILING WATER sterilizer especially suitable for syringes, needles and the many steel surgical instruments the efficiency of which are not impaired by repeated exposure in the medium of boiling water.

Model 8 is ideal for the private home where sterilization of hypodermic syringes and needles employed in the treatment of diabetes and other conditions is required.

TWIN CHARACTERISTICS

- Chamber dimensions 2½ x 3¼ x 8 inches.
- Fabricated of cast bronze, stainless steel and Monel metal, with Fenwal precision thermostatic control unit for accurate temperature maintenance.
- Constructed to permit cover to open full 90° and automatic lifting of instrument tray which may be easily and firmly secured for draining.

Ask your dealer or write us for further information

AMERICAN STERILIZER COMPANY

Erie, Pennsylvania

Prevent Makeovers and SAVE Valuable Time!

with

CLOVERLEAF

Impression

PLASTER

WINTERGREEN

OR UNFLAVORED

For faithful reproduction of every detail of teeth and tissue, dentists know they can trust Cloverleaf Impression Plaster. Sets rapidly and accurately; distortion-free; breaks with a clean fracture.

HARDITE STONE MODEL

Holds the case to unchanging dimension during curing. Laboratory controlled manufacture assures consistent uniformity of all properties essential to perfect fit and articulation.

Also manufacturers of: Standard Set Plaster; Hard Plaster; Laboratory Plaster; Vulcanizing Stone; Flasking Compound.

FREE SAMPLES to TEST AND COMPARE

H. B. WIGGIN'S SONS CO. A-2
Bloomfield, N. J.

Gentlemen:

Please send free sample of:
CLOVER LEAF XX Impression Plaster
☐ Wintergreen ☐ Unflavored
HARDITE STONE MODEL ☐

Dr.....

Address.....

City..... State.....

"Super Absorbent" COTTON ROLLS

These improved cotton rolls are a delight to the efficient dentist and are not harsh to the patient's mouth. They are actually spun from 100% pure surgical absorbent cotton to make them softer, more pliant and noncollapsible. They adapt easily into any position, are stretchable and small tufts are quickly detachable.

DENTAL ABSORBENTS CO.
619 East Montecito St.
Santa Barbara, Calif.

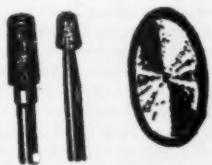
FREE SAMPLE Use Coupon

Gentlemen:
Please send me a free, generous sample of DENTAL ABSORBENTS.

DR._____

STREET_____

CITY and STATE_____



More and More Dentists Ask for

INDIAN HEAD NON-CLOGGING DIAMOND POINTS or WHEELS

5 for $10.00

- Finest quality; long wearing
- Fast, smooth, even cutting
- May be used on any hard amalgam found in natural teeth
- This offer subect to immediate withdrawal without notice.

INDIAN HEAD DIAMOND STRIPS—for use with Acrylics, narrow and wide. $5.00 per set of 2.

Write for Literature

UNION BROACH CO., INC.
37 W. 20th St. **New York 11, N. Y.**

There's a CAL-LAB near Your office

Your nearby CAL-LAB is one of a group of carefully selected laboratories extending from coast to coast and across the borders into Canada and Puerto Rico . . . Selected for its readiness and competence to render an unlimited service. Unlimited not only in the sense that the service is complete, but more fundamentally because the service is unfettered by bonds of politics and because it is qualitative in every step of construction, ethical in every respect. To *you*, one of the outstanding advantages of CAL-LAB service is the untiring efforts of its Central Research Organization and the limitless imagination of its scientists whose task it is to improve laboratory standards for better service today and tomorrow. Call your CAL-LAB.

The CAL-LAB Group

DO YOU READ CAL MAGAZINE? ASK YOUR CAL-LAB TO SEND IT TO YOU

CERTIFIED DAIRY LABORATORIES cal SERVICE

® REG U S PAT OFF

ALABAMA
Birmingham
Mobile

ARIZONA
Phoenix

CALIFORNIA
Compton
Fresno
Inglewood
Long Beach
Los Angeles
San Bernardino
San Diego
San Francisco
San Jose
San Mateo
Stockton

COLORADO
Denver

CONNECTICUT
Bridgeport

FLORIDA
Jacksonville
Miami
Orlando
Tampa

GEORGIA
Atlanta
Augusta
Macon

IDAHO
Boise

ILLINOIS
Aurora
Chicago
Danville
Decatur
Elgin
Freeport
Ottawa
Peoria
Quincy
Rockford
Springfield

INDIANA
Evansville
Ft. Wayne
Indianapolis
South Bend
Terre Haute

IOWA
Cedar Rapids
Davenport
Des Moines
Ft. Dodge
Sioux City
Waterloo

KENTUCKY
Lexington

LOUISIANA
New Orleans

MAINE
Portland

MARYLAND
Baltimore

MASSACHUSETTS
Boston

MICHIGAN
Battle Creek
Detroit
Grand Rapids
Saginaw

MINNESOTA
Duluth
Mankato
Minneapolis
Rochester
St. Cloud
St. Paul

MISSOURI
Kansas City
St. Louis

MONTANA
Billings
Butte

NEBRASKA
Norfolk
Omaha

NEVADA
Reno

NEW JERSEY
Jersey City
Newark
Paterson

NEW MEXICO
Albuquerque

NEW YORK
Albany
Binghamton
Bronx
Brooklyn
Buffalo
Far Rockaway
Mt. Vernon
New York City
Rochester
Syracuse

NORTH CAROLINA
Asheville
Charlotte
Greensboro
Raleigh

NORTH DAKOTA
Fargo
Grand Forks
Minot

OHIO
Akron
Cincinnati
Cleveland
Columbus

OHIO—(Cont.)
Dayton
Portsmouth
Toledo

OKLAHOMA
Oklahoma City
Tulsa

OREGON
Portland

PENNSYLVANIA
Harrisburg
Lancaster
Philadelphia
Pittsburgh

SOUTH CAROLINA
Greenville

TENNESSEE
Knoxville
Memphis
Nashville

TEXAS
Abilene
Amarillo
Dallas
El Paso
Ft. Worth
Houston
San Antonio
Wichita Falls

UTAH
Salt Lake City

VIRGINIA
Norfolk
Richmond
Roanoke

WASHINGTON
Seattle
Spokane
Tacoma

WEST VIRGINIA
Charleston
Clarksburg

WISCONSIN
Eau Claire
Green Bay
LaCrosse
Madison
Milwaukee
Oshkosh
Wausau

WYOMING
Laramie

CANADA
Calgary
Regina
Toronto
Vancouver
Winnipeg

PUERTO RICO
San Juan

2 DWTS
NEY-ORO A-1
INLAYS GOLD COLOR MEDIUM HARD
Also for casting abutments and
THE J. M. NEY COMPANY, HARTFORD 1, CONN. U.S.
2 DWTS
NEY-ORO B-2
INLAY and BRIDGE
THE J. M. NEY COMPANY, HARTFORD 1, CONN., U.S.A.
2 DWTS
NEY-ORO G-3
PARTIAL DENTURES
Gold color. Extra hard. For casting
partials, bars, clasps, bridgework,
extra hard inlays, full dentures.
THE J. M. NEY COMPANY, HARTFORD 1, CONN. U.S.A.
THE BALANCED LINE

28NY49

Ennis—Dental Roentgenology

By LeROY M. ENNIS, D.D.S.

Professor of Roentgenology in the Thomas W. Evans Museum and Dental Institute, School of Dentistry, University of Pennsylvania, Philadelphia

This up to date book is a sound and proven aid to all who want or need to perfect their technic in the exposure and development of roentgen films—*and in their accurate interpretation.* A large section is devoted to dental pathology in its relation to roentgenology. There are 1561 illustrations. ". . . of value to dental roentgenologists, dental students and teachers."—*Jl. of the American Dental Association.*

4th Edition. 538 Pages. 1561 Illustrations on 1207 Figures. $10.00

Levy—Acrylic Inlays, Crowns and Bridges

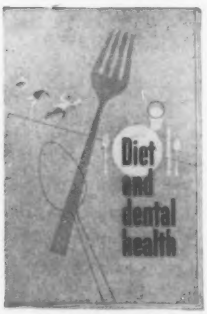
By IRWIN ROBERT LEVY, D.D.S.

Formerly Director, American Training Institute; Chief of Dental Clinic, Big Sisters Organization, New York City; Assistant Dentist, Mt. Sinai Hospital; Author of "A Textbook for Dental Assistants"

A definite need of the dental profession has at last been filled by this book. It is a concise guide on procedure for those who use or want to use synthetic resins for restoring teeth. The material is based on the author's successful experience in this field and is filled with actual technics which the practicing dentist can use in his own office. The 151 illustrations consist of carefully chosen photographs showing actual technic, and line drawings made to bring out important points mentioned in the text.

128 Pages. 151 Illustrations. $3.75

Washington Square **LEA & FEBIGER** Philadelphia 6, Pa.



WHEN YOUR PATIENTS WANT TO KNOW ABOUT DIET—

Be prepared with a supply of "Diet and Dental Health"—a 16-page pamphlet that answers patients' questions in lay language. Authoritatively written, "Diet and Dental Health" contains the latest and best information on a subject in which there is great patient interest. Get a supply today!

A free, sample copy will be sent on request.

Order Department, AMERICAN DENTAL ASSOCIATION
222 East Superior Street, Chicago 11, Illinois

Prices for DIET AND DENTAL HEALTH:

☐ *25 Copies.....$ 3.00*
☐ *50 Copies.....$ 5.25*
☐ *100 Copies.....$ 8.90*

Please send remittance with order.

name _____

address _____

city _____ *zone* _____ *state* _____

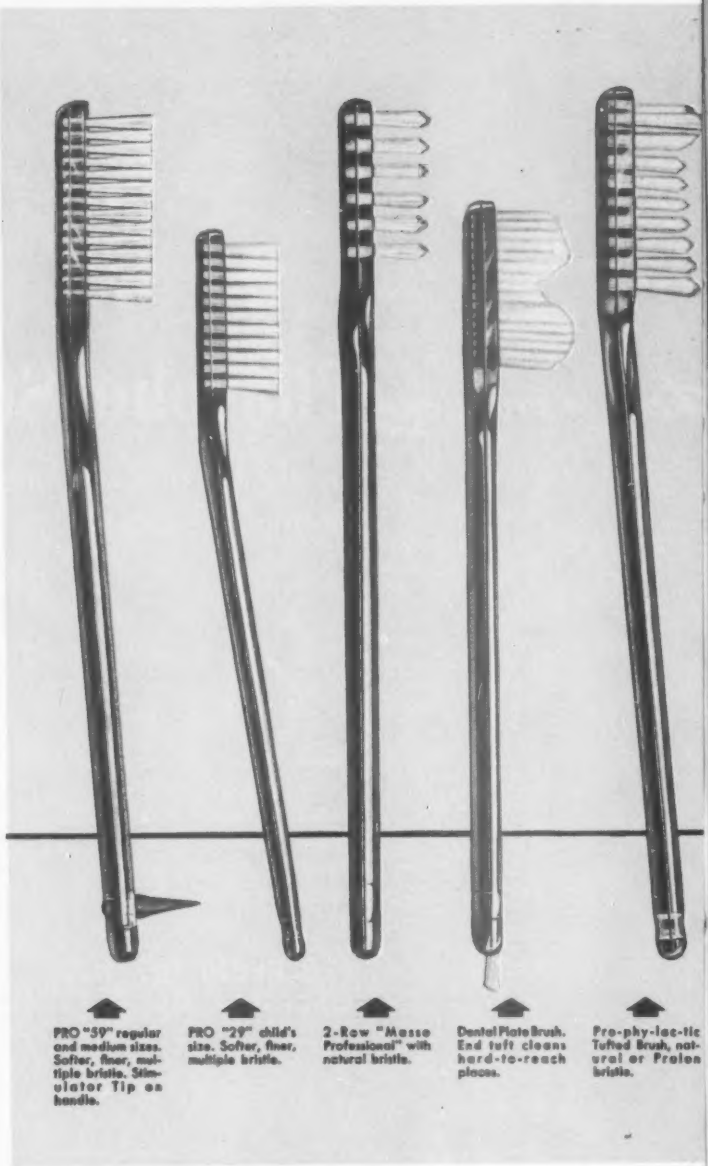
please type or print

there is only one **Phospho-Soda** (fleet)

— safe and effective whenever laxation is indicated

Phospho-Soda (Fleet) is a solution containing in each 100 cc sodium biphosphate 48 Gm. and sodium phosphate 18 Gm. Both 'Phospho-Soda' and 'Fleet' are registered trademarks.

C. B. FLEET CO., INC.
LYNCHBURG, VIRGINIA


PRO "59" regular and medium sizes. Softer, finer, multiple bristle. Stimulator Tip on handle.
PRO "29" child's size. Softer, finer, multiple bristle.
2-Row "Masso Professional" with natural bristle.
Dental Plate Brush. End tuft cleans hard-to-reach places.
Pro-phy-lac-tic Tufted Brush, natural or Prolon bristle.

WE'D LIKE YOU TO MEET THE ENTIRE PRO-PHY-LAC-TIC FAMILY!

Only you as a doctor know the exact type of brush each patient needs. To meet these needs Pro-phy-lac-tic makes a whole family of brushes.

Recently we have been telling you about our soft bristle brushes—the medium and regular size PRO "59" with Stimulator Tip for adults and PRO "29" for children. We also make a 2-Row "Masso Professional" Brush with natural bristle, and a tufted model with natural or Prolon bristle. For your patients with dentures there's the Pro-phy-lac-tic Plate Brush, designed in accordance with specifications set by dentists.

The next time you prescribe a tooth brush please remember that Pro-phy-lac-tic makes all types.

If you would like professional samples of any of our brushes please fill out and mail the coupon below.

PRO-PHY-LAC-TIC BRUSH CO.

Florence, Mass.

Pro-phy-lac-tic Brush Company
Florence, Mass.

Gentlemen:

Please send me Professional Samples of the brushes which I have checked.

Name.....
(Please Print)

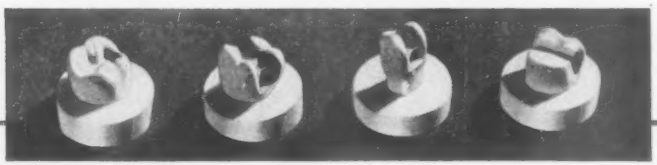
Address.....

City.....State.....

- ☐ PRO "59" (regular size) with StimulatorTip.
- ☐ PRO "59" (medium size) with Stimulator Tip
- ☐ PRO "29"
- ☐ Pro-phy-lac-tic Tufted Brush
- ☐ Pro-phy-lac-tic 2-Row "Masso Professional" Brush
- ☐ Pro-phy-lac-tic Dental Plate Brush

FOR MODELS . . FOR DIES:

- ***GREATER PRECISION . .***
  ONLY HALF AS MUCH EXPANSION (SETTING DISTORTION) as the most accurate of previous stones.
- ***GREATER STRENGTH . .***
  NEARLY FIFTY PER CENT HIGHER CRUSHING STRENGTH than the strongest of conventional stones.
- ***GREATER SURFACE HARDNESS . .***
  VASTLY MORE RESISTANT TO CHIPPING OR ABRASION; its ultra-smooth, dense surface retains minutest detail.



Duroc ideally fulfills the demand for a precision die material of extreme hardness for use in conjunction with the elastic impression materials in the indirect technic for inlay and bridge work.

Available in 5-, 15-, 35-, 50- and 100-pound containers.

ORDER A CAN FOR TRIAL NOW!

THE RANSOM & RANDOLPH COMPANY
TOLEDO 1, OHIO

Pennies that mean *dollars*

in Satisfaction to your Patients!

How often has your selection been swayed toward a *better* product, when you know the facts? You've often paid a little extra to get a car that will give you greater comfort . . . yes, and you've chosen to pay more for equipment that permits you to serve your patients better.

A recent survey proved conclusively that better than half of *all* denture patients would do likewise . . . *if asked.* They'd prefer to pay a little more for a denture that gives them greater mouth comfort, less breakage, a more accurate interpretation of your prosthetic skill.

We're speaking of the tougher, thinner denture made with Luxene 44, the Vinylite® denture material that is 2 to 3 times stronger than ordinary acrylics. The few extra pennies *you* spend on Luxene 44 are worth dollars in satisfaction to your patients.

Luxene 44

the Vinylite® Denture Material

®Registered Trade Mark

It's what you do at the chair, doctor
plus
what your patient does at home
that adds up to sound oral hygiene.
IPANA
TOOTH PASTE
Product of BRISTOL-MYERS • 19 West 50 Street, New York 20, N. Y.

FEBRUARY 1952 VOLUME 44 • NUMBER 2

THE Journal OF THE AMERICAN DENTAL ASSOCIATION

The dentist's responsibility in the fluoridation of municipal waters

The fluoridation of communal water supplies as a public health method of partially controlling dental caries now has passed from the theoretical to the practical stage. Data obtained from several pilot programs, at the conclusion of five years, have substantiated the hypothesis of early investigators, proved the anticariogenic effect of the procedure and disclosed no evidence that water fluoridated to the extent of 1 ppm is harmful to the human system. As A. P. Black states, "the reduction of the incidence of dental caries gives promise of being one of the landmarks in the history of public health, not only in this generation but in this century."

The following articles by Frederick S. McKay, A. P. Black, Milton E. Nicholson, F. A. Bull and Allen O. Gruebbel, delivered before the Section on Dental Public Health at the ninety-second annual session of the American Dental Association in Washington, D. C., October 17, 1951, present the viewpoint of the researcher, chemist, general practitioner and public health dentist on this new and important topic.

THE STUDY OF MOTTLED ENAMEL (DENTAL FLUOROSIS)

Frederick S. McKay, D.D.S., Colorado Springs, Colo.

At the turn of the century two principal developmental lesions of the enamel were recognized in dental pathology. One, which occurred frequently, was then termed "atrophy" and the etiology was fairly well understood. There was no known explanation for the second, white spots in the enamel.

It was recognized then, and probably it still holds true, that no one had written on or studied enamel lesions more exhaustively than G. V. Black. In 1906-

This symposium presented before the Section on Dental Public Health, ninety-second annual session of the American Dental Association, Washington, D. C., October 17, 1951.

1907 a condition existing in Colorado Springs—namely, the occurrence of an identical developmental lesion in practically the entire native population—was brought to his attention. Following a personal examination in 1909, he declared it to be a new lesion in dental pathology and he gave it the name "mottled enamel." At that time a similar condition was not known to exist in any other part of the world.

Widespread examinations were made in similarly afflicted districts as they gradually came to light during the years following. The investigators were concerned with identifying any possible common factor that might lead to the cause of the lesion. It gradually became apparent that the one invariable common factor was the continuous use of the domestic water supply during the years of enamel formation.

The results of these examinations were embodied in a series of four articles published in 1916 under the joint authorship of Dr. Black and myself,[1] the first complete description of this lesion to appear in dental literature. A brief synopsis of the articles was presented at the Panama-Pacific Dental Congress in San Francisco on September 1, 1915.[2]

Black[3] said, ". . . if the hidden cause of this lesion is to be found in the water, it must be by other than the ordinary chemical analysis. Future work must be to search for the presence of some constituent heretofore undetermined." In view of what has been found to be the futility of the standard water analysis, this prediction by Black was significant. Present knowledge shows how completely correct he was.

The investigation during the years following, in various parts of this country and in foreign countries, was focused on a closer establishment of the water relationship. The waters associated with mottled enamel were derived from almost every conceivable source—shallow wells, clear mountain streams, high mountain lakes at timberline, from within mines and from the lava from Mt. Vesuvius in Italy. It was found that frequently the water in endemic districts came from drilled wells of varying depths. Some of the largest endemic districts used water from such a source.

The first consciousness of this relationship grew out of an examination made in 1915 in a small coal mining community in Colorado where the town's water was pumped from one of the coal mines. The damage to the teeth in this community was the most severe that had been encountered up to that time.

EARLY INVESTIGATIONS

Three episodes that furnished conclusive evidence of the correctness of the water hypothesis were as follows:

The first, in 1916, at Britton, S.D., had to do with a change some years prior of the domestic water supply from individual shallow wells to a deep drilled well. Following this shift in water supply a startling change took place. Mottled enamel became endemic among all children born subsequently who made continuous use of the new deep well water, whereas, prior to the shift, mottled enamel was unknown.

The second episode, at Oakley, Idaho, was strikingly similar in its major aspects. After the town began using a nearby warm spring as the source of its water supply mottled enamel became endemic whereas it was unknown before that. This was confirmed by an examination in 1925. The evidence was so conclusive that

1. Black, G. V., and McKay, F. S. Mottled teeth: I. An endemic developmental imperfection of the teeth heretofore unknown in the literature of dentistry. II. An investigation of mottled teeth. D. Cosmos 58:129 (Feb.) 477 (May) 627 (June) 781 (July) 894 (Aug.) 1916.

2. McKay, F. S., and Black, G. V. A brief synopsis of a paper entitled mottled teeth; an endemic developmental imperfection of the enamel of the teeth heretofore unknown in the literature of dentistry. Panama-Pacific D. Cong. 1:25, 1915.

3. Black, G. V. Operative dentistry. Vol. 1: The pathology of the hard tissues of the teeth, ed. 3. Chicago, Medico-Dental Pub. Co., 1917, p. 41.

shortly thereafter a water supply from another source was substituted. This was the first instance in dental history where a municipal water supply was given up and a different supply substituted for the sole purpose of remedying a dental condition. A re-examination in 1933, 8 years after the change of water supply, revealed that further production of mottled enamel had completely ceased.

The third episode, at Bauxite, Ark., where the water supply was first examined in 1928, was identical with the other two. Several years prior to 1928 the use of individual shallow wells had been discontinued for sanitary reasons and a municipal supply from three deep drilled wells was substituted. Mottled enamel became endemic in the native population born subsequent to the change of water. A water supply from another source was piped in and the deep wells were sealed. Up to this point in the study nothing had been determined, beyond the fact that mottled enamel was a water-borne disease, and, so far as was known, the only water-borne disease of the teeth.

This study in Bauxite led directly to the discovery of fluoride, an unexpected constituent of domestic water supplies. This was announced in a personal letter from the discoverer, H. V. Churchill, chief chemist of the Aluminum Company of America, dated January 20, 1931. The letter gave the fluoride content of the deep well water at Bauxite as 14 ppm. This extremely high content was reflected in the general severity of the enamel lesion.

Churchill went further. Samples of water from several communities where mottled enamel was endemic were examined and fluoride was found in all of them. Samples of water from a number of communities in which there was no mottled enamel were found to be free from fluoride, or practically so.

Later, the water from the Oakley warm spring was found to have 8.0 ppm fluoride. A similar relation between fluoride and mottled enamel was demonstrated by Margaret Cammack Smith[4] in contemporary work carried on at the University of Arizona.

A re-examination at Bauxite after 10 years revealed that there had been no further production of mottled enamel after the change of water.

Britton, Oakley and Bauxite were the first communities in which results following a change of water could be observed and conclusions could be drawn. These three episodes went far in establishing the basic concepts of the behavior of dental fluorosis.

At Britton the teeth that had calcified during the use of the original shallow well water did not become mottled after the deep well water came into use. At Oakley and Bauxite the mottled condition of the teeth that had been produced by the original warm spring and deep well waters, respectively, was still present after 8 and 10 years' use of water free from fluoride.

The important conclusions, therefore, are that (1) dental fluorosis can be acquired only during the formative period of the teeth and (2) once acquired it is permanent for life even were the individual to move from a locality where fluorides were present to a region where they were not present. An individual whose teeth have been calcified in a locality where fluorides were not present will not acquire dental fluorosis by later residence in a locality where fluorides are present.

CARIES EXPERIENCE RATE AND FLUORIDE CONTENT OF WATER

It became apparent during these studies that invariably the caries experience rate among the natives of districts where fluoride was present was remarkably low

4. Smith, H. V., and Smith, M. C. Mottled enamel in Arizona and its correlation with the concentration of fluorides in water supplies. Univ. of Arizona Agr. Exp. Sta. Tech. Bull. 43. 1932.

even when the degree of dental fluorosis was pronounced or even extreme. After this recognition, relating the caries experience rate to the fluoride content of water supplies became the major purpose of this study.

The first examinations to determine this relationship were made in Wisconsin and other parts of the Midwest by Bull, Dean, Arnold and others.

The problem, as stated by Dean, was to determine the amount of fluoride content a water should have to be high enough to afford protection against caries and at the same time be low enough to avoid conspicuous dental fluorosis. The exhaustive research conducted by Dean and his coworkers over a wide territory not only confirmed beyond question the hypothesis of a high caries rate associated with low fluoride content but also established that the safe and effective fluoride content was around one part fluoride in a million parts of water.

When the fluoride content passes 1.5 ppm, or approaches 2.0, the probability of producing a disfiguring fluorosis increases. Data on the caries experience rate have been based almost entirely on the condition of children and young adults, but what is the condition in middle life of persons with fluorosis? Only two studies bearing on this are known to have been made.[5,6] Both studies are in agreement that the caries inhibitory action of fluoride extends well into middle life.

It has been observed that when persons move from localities where fluorides are present to localities where they are not present, the protection of the fluoride is not thereby diminished. The average caries experience rate among such migrants is practically the same as among persons who remained residents of a locality where fluorides were present. The conclusion is that it is not necessary to continue use of fluoridated water after the enamel has been calcified.

The evidence now available indicates that three is the average number of decayed, extracted and filled teeth per native person, at an average age of 25 years, in a region where fluorides are present, and that a third or more of native individuals are caries free.

Dentists and research workers have been studying for decades hoping to find a means of preventing the initial lesion of caries. Effort usually has been concentrated on altering the environment of the teeth. The action of fluoride affects the structure or character of the teeth themselves. It might be said that for the first time a new and different kind of tooth structure is being dealt with which has the property of resisting the initial caries attack. When caries occurs in such teeth it is practically limited to the fissures and pits. Caries of the proximal surfaces of the anterior teeth is almost negligible.

RESULTS OF STUDY

The practical application of the results of study have led to the fluoridation of public water supplies, the impact of which on public health and the future practice of dentistry cannot be completely evaluated at present.

Endorsement of fluoridation by authoritative groups has followed reports of pronounced reduction in the caries experience rates in certain communities after four or five years' experience with fluoridation.

That there are vast populations in this and in other countries who exhibit dental fluorosis has long been known. It has been learned recently through statewide surveys made of municipal water systems that there are perhaps equally vast populations who have used low fluoride bearing waters without experiencing visible fluorosis of the teeth. In a total of 573

5. McKay, F. S. Mass control of dental caries through the use of domestic water supplies containing fluorine. Am. J. Pub. Health 38:828 (June) 1948.

6. Russell, A. L., and Elvove, Elias. Domestic water and dental caries. VII. A study of the fluoride-dental caries relationship in an adult population. Pub. Health Rep. 66:1389 (Oct. 26) 1951.

surveys in Ohio, 97 communities had 0.9 ppm fluoride or over; 33 had 1.5 or over; 9 had 2.0 or over. In Iowa, in 951 sources tested, 222 communities had from 0.5 to 1.0 ppm; 99 had 1.0 to 1.5; 59 had 1.5 to 2.0. It seems reasonable to assume that until recently the populations in the localities where mottling did not take place had lived in complete unawareness of the presence of fluoride.

SUMMARY

The following two conclusions may be emphasized: (1) the integrity of the structure of the enamel is determined only during the period of calcification and not thereafter; (2) fluoride is the only known agent ordinarily included in the diet that is capable of exercising a mass control of dental caries.

Certain unique features pertaining to the study of fluorosis are as follows:

Dental fluorosis is the only lesion of the teeth that is limited in its distribution to definite geographic areas.

Its investigation was begun without the advantage of any previous study having appeared in dental or medical literature. It is unique as a research problem in being so devoid of variables; that is, the same influence always produces the same lesion, differing only in intensity, in all individuals who have been exposed to it in whatever part of the world it is found. It is noteworthy to record research that, starting from zero, has discovered the cause of a pathologic condition and demonstrated a means for its prevention within a period of 25 years.

An equally noteworthy feature of the study is the high quality of the persons who have been attracted to it, not only in dentistry but in other professions as well—persons who have, particularly in recent years, contributed in such volume to the better understanding of the problem.

700 Exchange Bank Building

THE CHEMIST LOOKS AT FLUORIDATION

A. P. Black, Ph.D., Gainesville, Fla.

Sir James Crichton-Browne,[1] in speaking before the British Dental Association, June 22, 1892, took for the subject of his address the thesis that dental caries was increasing in England. The following quotation from that memorable address stamps him not only as an able scientist and a keen observer but also as the first to call attention to the possible connection between a dietary fluorine deficiency and dental caries. His words were as follows:

> The late Dr. George Wilson showed that fluorine is more widely distributed in nature than was before his time supposed, but still, as he pointed out, it is but sparingly present where it does occur and the only channels by which it can apparently find its way into the animal economy are through the siliceous stems of grasses and the outer husks of grain, in which it exists in comparative abundance. Analysis has proved that the enamel of the teeth contains more fluorine, in the form of fluoride of calcium, than any other part of the body and fluorine might, indeed, be regarded as the characteristic chemical constituent of this structure, the hardest of all animal tissue and containing 95.5 per cent of salts, against 72 per cent in the dentine. As this is so it is clear that a supply of fluorine, while the development of the teeth is proceeding, is essential to the proper formation of

Head, department of chemistry, University of Florida, Gainesville, Fla.

1. Crichton-Browne, Sir James. Tooth culture. Lancet 2:6. 1892.

the enamel and that any deficiency in this respect must result in thin and inferior enamel. If, in our dislike to grittiness, which has run parallel to our addiction to soft and succulent food and in our preference for white and fine flour, we have cut off the main source of supply of fluorine to our systems, it is not difficult to understand how we may have thereby incurred comparatively feeble and unprotected teeth, with a diminished power of resistance to adverse influences and peculiarly liable to decay. For the dense close-fitting prisms of the enamel are to the tooth what its armour-plates are to a modern ship of war; and if they are easily penetrated, corroded, or worn away, then the fate of the dentine within is sealed. I think it well worthy of consideration whether the reintroduction into our diet, and especially into the diet of child-bearing women and of children, of a supply of fluorine in some suitable natural form—and what form can be more suitable than that in which it exists in the pellicles of our grain stuffs?— might not do something to fortify the teeth of the next generation.

Now almost 60 years later, the importance of that now historic statement is at last being realized.

FLUORINE, THE ELEMENT

Fluorine, lightest and most active of a family of elements known as "the halogens" was first isolated by the French chemist Moisson in 1886. It is not only the most active of its family, but is the most active element known, combining directly with all other elements except oxygen and the rare gases. It is a gas, pale yellow in color, slightly heavier than air, boiling at −187°C. and freezing at −223°C. Like chlorine, bromine and iodine, the other three members of the halogen family, its compounds are widely distributed in nature. Commercial deposits of calcium fluoride or fluorspar occur in Illinois and Kentucky; Iceland and Greenland have important deposits of cyrolite, a double fluoride of sodium and aluminum; and the great phosphate deposits of Florida, Tennessee and Kentucky contain about 4 per cent of the element which is present as fluoapatite, a double phosphate and fluoride of calcium. It is present in most soils and in the bones and teeth of animals. Sea water contains approximately 1 ppm of the element and it is present in amounts varying from mere traces to significant concentration in a high percentage of the public water supplies of this country. The brochure prepared by the Council on Dental Health of the American Dental Association[2] presents the figures of Hill and co-workers indicating that of 6,299 public water supplies examined, 1,416 or 22.3 per cent contain in excess of 0.6 ppm of fluoride and many of the remaining supplies contain lesser amounts. Fluorine is present in a great many human foods, although the average daily intake from food is small, being estimated by McClure[3] at 0.19 to 0.32 mg. Fluorine has assumed steadily increasing importance in the industrial chemistry field in recent years. It is a constituent of the Freons, one of which, dichlorodifluoromethane, has revolutionized refrigeration. It is a constituent of "1080," the trade designation of sodium fluoroacetate, one of the newer rodenticides, and hundreds of organic chemists are devoting their time to research in the field of fluororganic chemistry. One of the most successful methods for desalting sea water in small quantities developed during World War II consisted in the use of a mixture of silver fluosilicate and lime.

Since the sterilization of municipal water supplies with chlorine is termed chlorination, the question is often asked, "Why is not the addition of a fluorine compound to water termed fluorination rather than fluoridation?" The answer of the chemist is simple. Chlorine is added to the water as the element whereas fluorine is added to the water in the form

2. Council on Dental Health. Fluoridation in the prevention of dental caries. Chicago, American Dental Association, 1951.

3. McClure, F. J. Ingestion of fluoride and dental caries. Quantitative relations based on food and water requirements of children one to twelve years old. Am. J. Dis. Child. 66:362 (Oct.) 1943.

of some one of its compounds. Since all of the compounds which have been employed to date are some type of fluoride, the process is properly called fluoridation.

It was a chemist, H. V. Churchill,[4] who in 1931 first called attention to the fact that the water supplies of Bauxite, Ark., Colorado Springs, Colo., Kidder, S. D., Ledgerwood, N. D. and Oakley, Idaho, all known to produce mottling of teeth, contained fluoride, a fact which hitherto had not been recognized. While Churchill was careful to state that because of the few samples examined his work could not establish a definite correlation between the presence of fluoride and the production of mottled enamel, its publication immediately focused attention on fluorides in water and the connection quickly became apparent. In closing his paper Churchill asked two questions:

1. What physiological effects may be produced by fluorides in water?

2. What can the water chemist contribute to the concentration control of fluorides?

The answer to his first question, the reduction of the incidence of dental caries, gives promise of being one of the landmarks in the history of public health, not only in this generation but in this century. Much subsequent work has provided several answers to his second question.

METHODS OF REMOVING FLUORIDES FROM WATER

It has been shown that both coagulation and lime-soda softening, the two most widely used methods of water treatment, usually remove a portion of the fluoride when it is present. The proportion removed is dependent on many factors, and varies greatly but is probably sufficient in some cases. However, three specific methods have been developed, two of which are presently in use. Fluoride may be adsorbed from water by the use of activated carbon at pH values below 3.0. Since it is not practical to reduce the pH of drinking water to so low a value, the method has no practical application in the treatment of public water supplies. Fluoride may also be removed by passing the water through a bed of especially prepared tricalcium phosphate. When the absorptive capacity of the bed for fluoride has been reached, it is taken out of service and is regenerated with sodium hydroxide and, following an acid rinse, placed back in service. While the process is expensive, it is being used for defluoridating at least two public water supplies. The method which appears to offer most promise of practical and economical application is based on the observation that when waters containing fluoride, which also are high in magnesium, are softened, there is substantial removal of the fluoride. The method therefore consists in softening the water with dolomite lime which is a mixture of calcium and magnesium oxides; in adding calcined magnesia along with ordinary lime; or in adding magnesium sulfate, or Epsom salts to the water before it is softened with lime.

FLUORIDE COMPOUNDS

The first, and still the most widely used material for fluoridation, is sodium fluoride. It has been selected because it is commercially available in large quantities, is convenient to use, has a relatively high solubility which is fairly constant over a wide temperature range and is the compound which has been used for most studies on the toxicity and physiologic effects of fluorides. In its pure form it is a white crystalline salt which in practice is usually dyed blue or Nile green to distinguish it from other chemicals in the treatment plant. Its saturated

4. Churchill, H. V. Occurrence of fluorides in some water of the United States. J. Ind. & Eng. Chem. 23:996 (Sept.) 1931.

solution at 25°C. contains approximately 4 per cent by weight of the material which makes it suitable for feeding in solution in small volumetric feeders. Specifically, only 55.6 gallons of water are required to dissolve the 18.8 pounds of 98 per cent sodium fluoride needed to provide a dosage of 1 ppm of fluoride ion to one million gallons of water. Most recent quotations indicate its cost to be approximately 12 cents per pound on which basis the cost per pound of fluoride ion is 27 cents. In spite of the fact that another material is available at lower cost, the unique combination of properties listed will probably result in the employment of sodium fluoride for the majority of smaller installations throughout the country.

On the other hand, for the larger installations where cost is a primary consideration there is a tendency to employ sodium silicofluoride as the fluoridating agent. Whereas 98 per cent sodium fluoride contains only 44.4 per cent of fluoride ion, commercial sodium silicofluoride is 98.8 per cent pure and contains 60 per cent of fluoride ion. Furthermore, it is a cheaper chemical, the recent OPS ceiling price ranging from 7.0 to 8.9 cents per pound, depending on package and quantity. On this basis a pound of fluoride ion costs from 11.7 to 14.8 cents. Two factors make it much more difficult to feed in the smaller installations. The first is its relatively low solubility, a saturated solution containing only 0.76 per cent by weight of the material at 25°C. Furthermore, its solubility varies greatly with temperature, it being 5.6 times as soluble in water at 212°F. as at 32°F. It may, however, be readily and accurately fed in any of several types of dry chemical feeders.

A third chemical, hydrofluoric acid, has been employed thus far only at Madison, Wis. It is a highly corrosive liquid and a special and unusual setup was provided for feeding it. Madison is supplied by a number of individual wells located at different parts of the city and pumping directly into the distribution system, and space limitations, together with the local availability of the acid led to its selection.

A fourth chemical, hydrofluosilicic acid, has attractive possibilities if and when it becomes available in sufficient quantity. In the form of a 30 per cent solution it could be fed from the rubber-lined drum in which it was shipped directly into the water supply.

Sodium silicofluoride is often and correctly called sodium fluosilicate and it is of interest to inquire why it behaves as does sodium fluoride when added to a water supply. McClure[5] studied the effects of fluorine added to rats' drinking water in the form sodium fluoride as compared with sodium fluosilicate and found no differences in the effects on their teeth, on fluorine deposited in the bodies of the animals or in their rate of growth. The chemist explains that fact quite simply. When sodium fluosilicate is added to water whose pH value is 6.0 or above, it is immediately converted into colloidal silica and sodium fluoride, so that in effect the latter chemical is being fed.

Of 105 installations on which reports were available on August 15, 1951, 67 were feeding sodium fluoride, 33 sodium silicofluoride, 4 hydrofluosilicic acid and only one, Madison Wis., hydrofluoric acid.

FLUORIDE FEEDERS

The necessity for feeding a number of chemicals in both solid and liquid form in the usual processes of water treatment has resulted in the development of a considerable number of feeders of high accuracy and reliability. Many of these feeders are adaptable to feeding either

5. McClure, F. J. The availability of fluorine in sodium fluoride vs. sodium fluosilicate. Pub. Health Rep. 65:1175 (Sept. 15) 1950.

sodium fluoride or sodium silicofluoride. The most accurate types of dry feeders are those mounted on a scale which deliver a measured weight of chemicals in a given interval of time. They are preferable to volumetric dry feeders which feed a definite volume of material in a definite interval of time. In the latter type of feeder a variation in particle size or density will result in a variation in the dosage whereas in the gravimetric type feeder no variation will result. Dry feeders are usually employed on the larger installations whereas solution feeders, substantially less in first cost, are usually more adaptable to smaller installations. It is important, when feeding a fluoridating chemical in any type of feeder, to provide adequate safety measures for the protection of personnel handling the chemical. These precautions usually include vacuum dust filters to prevent dust in the room when the hopper is filled, dust respirators and rubber gloves for the operators and may include the use of colored material to distinguish it from other chemicals used in the plant.

OPTIMUM FLUORIDE CONCENTRATION

In 1933 Dean[6] reported that fluoride when present in public water supplies in concentrations not in excess of 1.0 to 1.5 ppm has no public health significance from the standpoint of the production of endemic dental fluorosis. Accordingly, when the preventive effect of sodium fluoride became apparent as the result of later studies, it was suggested that dosages of 1.0 to 1.5 ppm be used. A special committee of the American Water Works Association pointed out[7] in 1949 that climatic conditions might prove to be important, since they govern to some extent the water intake of the individual, and that whereas 1 ppm or more might be required in areas of low mean annual temperature, such as the Dakotas, as little as 0.5 to 0.6 ppm might suffice where climatic conditions are reversed as in the deep South or Southwest. Evidence continues to accumulate that this is true and it is now felt that a dosage of perhaps 0.7 ppm may be sufficient to provide the necessary protection in regions where the mean annual temperature is above 70°F.

CONTROL OF DOSAGE

In addition to employing the most accurate and dependable feeding equipment available, it is necessary to provide an additional safeguard by regularly and frequently determining the fluoride content of the treated water by a suitable method. A number of methods are available. In 1941 a committee of the American Water Works Association[8] studied 10 different methods and recommended the Sanchis method as modified by Scott as the most suitable and it is the one which appears in *Standard Methods for the Examination of Water and Sewage* published jointly by the American Public Health Association and the American Water Works Association. It is also the method recommended by the United States Public Health Service.[9] It is based on the fact that the zirconium lake of sodium alizarin sulfonate is decolorized by the fluoride ion, the color change being proportional to the concentration of fluoride in the water. In the determination, five milliliters of the reagent is added to 100 milliliters of the water being tested, the sample is allowed to stand for one hour at constant temperature and then is compared with standards containing known concentrations of fluoride ion to which equal volumes of the reagent

6. Dean, H. T. Distribution of mottled enamel in the United States. Pub. Health Rep. 48:703 (June 23) 1933.

7. Black, A. P., and committee. The fluoridation of public water supplies. Statement of recommended policy and procedure. J. Am. Water Works Assn. 41:575 (July) 1949.

8. Black, A. P., and committee. Methods of determining fluorides. J. Am. Water Works Assn. 33:1965, 1941.

9. Anonymous. Public health service drinking water standards, 1946. Pub. Health Rep. 61:371 (March 15) 1946.

have been added. Permanent glass color standards are now available which simplify the determination. Chlorides in excess of 500 ppm result in values which are too low and sulfates in excess of 150 ppm result in values that are too high. Iron, aluminum, phosphate and high alkalinity also interfere. If the sample being tested contains organic color or turbidity, the fluoride must be separated by distillation from a strongly acid solution and then be determined in the usual manner. Samples containing a chlorine residual following sterilization must be dechlorinated with the minimum quantity of sodium thiosulfate, or better, sodium arsenite. The procedure is so simple and rapid that it may be employed by the average well-trained operator in water treatment plants. It is accurate to 0.1 ppm under usual conditions which is sufficient for all practical purposes.

NEW FLUORIDATING AGENTS

The widespread public interest in fluoridation has stimulated research on other compounds which might be used. One of these which goes by the name of Flural appears to be a specially prepared aluminum sulfate or filter alum containing from 9 per cent to 18 per cent of fluorine. Most of the latter is in insoluble form. It is stated that when this material is employed in the usual manner for the coagulation of water supplies prior to filtration, the desired dosage of fluoride may be added to the water by selecting a composition suitable for the particular water being treated. It is claimed by the manufacturer that the material is only one-eighth as toxic as sodium fluoride and that, in the event that an excessive amount of fluoride is accidentally added, a portion of it will be removed in the treatment process. However, many of the variables now present will need to be eliminated before the material will be acceptable to state boards of health.

Muhler and Day, of Indiana University, using rats as test animals, have reported that stannic fluoride is more effective than either sodium fluoride or sodium silicofluoride in preventing tooth decay. There is no record that either Flural or stannic fluoride has ever been used in actual practice.

As time passes other new compounds will be proposed. It is extremely important to keep in mind the fact that the requirements which must be met by any new fluoridating agent are numerous and rigorous. The agent must, of course, be commercially available at a reasonable price, be water soluble and capable of being fed successfully in some of the feeders commercially available. These, however, while important, are relatively minor considerations. H. Trendley Dean[10] has listed the following additional important factors:

1. Reliable evidence must be available (as it is in the case of sodium fluoride occurring naturally in public water supplies) that the proposed new fluoridating agent will not be injurious to health even when ingested as part of the daily diet over a period of many years. With chemical additives to food on the increase, the importance of that criterion cannot be overemphasized. H. Shirley Dwyer has stated the case for fluoridation as follows:

> Many of the questions that arise today in regard to the fluoridation of communal water supplies were answered years ago by nature. Three of the absolutely necessary requirements for any valid scientific research have been automatically met by nature in the endemic regions of fluoride-bearing waters. Briefly, these three requirements are:
>
> *a.* Sufficiently large numbers of individuals under observation to avoid bias. In the case of natural fluoride-bearing waters we have thousands [and he might properly have said millions] of individuals who have been subject to the influence of fluorides in water.

10. Dean, H. Trendley. Private communication.

b. Continuation of the observed phenomenon over a sufficiently prolonged period of time. For as long as there has been water in the endemic areas, it has contained fluorine, and has been consumed by human beings living in these areas.

c. Proper controls. By this we refer to a similar set of circumstances alike in all respects, except lacking in the one phenomenon which is being studied. Geographic areas immediately outside the endemic areas furnish the controls when studying the fluoride problem.

Thus nature has done what men could only hope to do—carry out a truly scientific experiment, employing the method of difference, on large numbers of the population.

2. The commercially available product must not ordinarily carry impurities which might be injurious to health when ingested with the drinking water over a period of many years.

3. Suitable methods must be available for detecting and evaluating the amount of these objectionable impurities, if present.

4. When added to the drinking water, the fluorine content will "fluoridate" the water and produce the same results as are obtained by one of the recognized fluoridating agents, and not simply introduce fluorine into the water in a form which will not readily convert into the fluoride ion.

It is at once apparent that these specifications are such as to greatly restrict the use of new compounds which have been, or may in the future, be proposed as fluoridating agents. Even though a recent survey indicates that both sodium fluoride and sodium silicofluoride are presently in short supply, this is unquestionably a temporary condition. For example, the fluoride present in the tonnage of phosphate rock processed annually in Florida alone, if all recovered, is sufficient to fluoridate every public water supply in the United States. It is felt that the policy with respect to new fluoridating agents should be one of extreme conservatism.

MECHANISM OF CARIES PREVENTION

Physical chemists and biochemists have contributed to the solution of this problem and will continue to play some part in its ultimate solution. It is a particularly difficult problem to solve in view of the fact that the differences between the fluorine content of sound and carious teeth, if any, are small. Armstrong and Brekhus[11] have stated that the enamel of carious teeth contains less fluorine than the enamel of sound teeth. However, McClure[12] has recently reported that the dentin and enamel of several hundred sound and carious teeth, which showed no evidences of fluorosis, and which were obtained from nearly 100 individuals, did not differ in fluorine content in any relation to their carious or noncarious history. Many workers have shown that the fluorine content of teeth exhibiting mottled enamel is higher than that of normal sound teeth.

Two pieces of work which are interesting should be mentioned. The first is the observation of Dr. Krasnow of the Guggenheim Dental Clinic that the protein concentration in the saliva from patients with dental caries was higher than in saliva from caries-free patients. This conclusion, if substantiated by future work, not only would provide a valuable diagnostic index of dental caries but might also provide a clue to the mechanism involved.

Even more interesting are the long-range research studies of dental caries in animals being carried on at the Zoller Memorial Dental Clinic at the University of Chicago which employ the germ-free technic developed at the Labund Institute of the University of Notre Dame.[13] It was

11. Armstrong, W. D., and Brekhus, P. J. Possible relationship between the fluorine content of enamel and resistance to caries. J. D. Res. 17:393 (Oct.) 1938.

12. McClure, F. J. Fluorine in dentin and enamel of sound and carious human teeth. J. D. Res. 27:287 (June) 1948.

13. Blayney, J. R., and Orland, F. J. Living test tubes for dental research. Research Review (Office of Naval Research) May, 1951, p. 1.

found that a group of 13 white rats living on a normally caries-producing diet for 137 to 150 days experienced no caries in the absence of microbic life. The control group fed the same sterilized rations, but reared under normal laboratory conditions, had a caries experience of approximately 97 per cent. These results would appear to strengthen the arguments of those who maintain that dental caries is associated in some manner with the bacterial flora of the mouth. After reading the voluminous literature, the conclusion might be reached that there are a number of different factors which, singly or in combination, may produce dental caries. If that is true, the now demonstrated preventive effect of minimal concentrations of fluoride ion in drinking water becomes all the more impressive.

In July, 1949, the American Water Works Association[7] published its "Statement of Recommended Policy and Procedure with respect to the Fluoridation of Public Water Supplies." This was the first public statement issued by any national association on this still controversial subject. The policy of the Association is clearly set forth in the concluding sentence:

> In communities where a strong public demand has developed and the procedure has the full approval of the local medical and dental societies, the local and state health authorities, and others responsible for the communal health, water departments or companies may properly participate in a program of fluoridation of public water supplies.

All available evidence has indicated that the fluoridation of public water supplies is in the interest of group health and the chemists of America stand ready, as they always have and always will, to participate with the members of the dental profession in its practical realization.

544 N.E. Tenth Avenue

THE PRACTICING DENTIST'S VIEWPOINT

Milton E. Nicholson, D.D.S., Pittsburgh

Fluoridation of municipal waters is now generally accepted as one of the cheapest and most effective methods available for reducing the incidence of dental caries. Researchers, working independently of each other, have furnished the profession with so much data in support of fluoridation that it seems almost basic for all communities to fluoridate their water supplies.

Fluoridation has been widely endorsed as a simple and effective means of helping to control the incidence of dental caries. Even though leading groups have given their whole-hearted support and approval to the procedure, many practicing dentists are unaware of the progress being made. Through their ignorance regarding fluoridation and its results, they are misleading their patients and are thus helping to confuse the public.

Fluoridation is extremely important from a public relations viewpoint. The newspapers have been quick to realize the news value of such a process and have deluged the public with editorials, arti-

Associate professor of public health dentistry, School of Dentistry, University of Pittsburgh; clinical dentist, Bureau of Maternal and Preschool Service, City of Pittsburgh Department of Health, Pittsburgh.

cles and letters to editors. Persons from every walk of life have been able to break into print with all kinds of ideas, theories and criticisms. Small wonder that many people are confused by this barrage of reading material. The confusion must be eliminated and the skepticism of the public must be removed if progress is to be made in fluoridation. The practicing dentist must give his support and assistance by entering into the program with enthusiasm.

GENERAL CONSIDERATIONS

The practitioner is the ideal person to help further any program aimed at prevention and control of dental disease. He frequently does not realize how important he is in helping to create public opinion. His close relationship with patients and his unique position as an accepted leader in the community and an expert in matters pertaining to dental health, place him in a position where he can guide the dental health thinking of those with whom he comes in contact. An aroused public is today more interested in public health than ever before. Dental research has brought to light several preventive measures which promise beneficial results. As is frequently true, some of these new developments are slow to be accepted by public and profession alike. This is as it should be, but if dentists, as experts, do not use proved and tested data in giving the public intelligent answers to their questions, they are not fulfilling their responsibilities.

PRACTITIONER'S VIEWPOINT

It is always difficult and often impossible to state the accepted opinion or viewpoint of a large group with regard to a single subject. This is especially true with a group of dentists, who, because of the very nature of their work, are rugged individualists with differing opinions on many phases of everyday practice.

Fluoridation is relatively new and it is understandable that many practitioners fail to grasp the scope of control which it offers. Although it has been proved to be advantageous, many dentists are regarding the process with mixed feelings. Skepticism, opposition, noncooperation with dental groups and, in some instances, plain indifference, characterize the attitudes. The public reflects the attitudes imparted to it by the family dentist and progress is seriously impaired. Many practitioners are strong exponents of fluoridation and are exerting their efforts to furthering it. Unfortunately this group is far too small to effectively influence community effort toward fluoridation.

SIMILAR PROCEDURES

Procedures relating to prevention and control have long been studied and considered by the dental profession in the battle against dental disease. A number of far-sighted dentists and researchers have realized for years that the dental caries problem will never be solved by repair service alone. As a result many preventive methods have been subjected to experimentation and some have proved of worth. Dietary and nutritional habits, proper use of the toothbrush, reduction in intake of refined starches and sugars, good operative procedures, topical applications of fluorides—all have been demonstrated to be good preventive methods which can be recommended to patients. These are in the same category as fluoridation of municipal waters, the only difference being that never before has there been a method devised as cheap, as simple to administer, as effective and as far reaching as fluoridation.

For some strange reason a large number of practitioners have practically ignored preventive measures and haven't considered it part of their responsibility to give preventive and control advice to patients. It is not surprising that these same individuals are not excited about fluoridation.

THE PRACTICING DENTIST

The dental practitioner of today is busy and is frequently under great pressure from the stress and strain of serving his patients. He is constantly trying to readjust himself to the increasing demands of his practice. Because of the shortage of civilian dentists during and after World War II, the tempo of his work was increased until at times the pressure was almost unbearable.

During the last several years, the increased interest by the public in dental health, plus the increase in most family incomes, has raised the effective demand for dental services. The average practicing dentist in the United States in 1951 is in an enviable position economically. His appointment book probably is filled for months ahead. The demand for dental service has grown to such proportions that almost all of his operating time is scheduled on a very rigid basis. It is with difficulty that he is able to schedule emergency treatments and services to small children. Little time is available for family life, recreation, reading or study. His life is so completely occupied with relieving pain and reconditioning mouths that he has little time to devote to research and dental health education.

This dentist is indeed a busy man. He also is likely to be a tired, nervous and irritable man, and worst of all, a man in a deep rut. Although he serves his patients well he serves his profession and himself indifferently. He works at cross-purposes with those of his fellows who are keeping in close touch with current developments in public health and with preventive and control methods in dentistry.

The practicing dentist can be proud of his contribution to society in alleviating and eliminating pain, in repairing and restoring impaired or lost dental function, and in helping to develop the operative technics and procedures associated with an improved treatment service. These contributions have been largely instrumental in creating the prestige which dentists enjoy. In the modern conception of health service, however, these contributions are not enough. Each dentist, in addition to being a good operator, must ground himself thoroughly in dental preventive and control methods. As a member of a highly specialized profession he must exert all his efforts toward solving the dental health problem.

PUBLIC ATTITUDE

A large segment of the public regards the dentist as he regards himself; namely, a repairman, nothing more. It never enters their minds that the dentist is a member of a learned profession. In fact many do not even refer to him as "Doctor." This is a deplorable condition. When seeking advice on dental health these people consult their family physician, the pediatrician, or, in many instances, a member of one of the pseudo-medical groups which prey on the public for a living. They never think of the dentist as the proper person to guide them in dental matters, aside from repair service.

Many periodicals and newspapers have misled the public repeatedly in dental health education because some feature writer has told half-truths or has accepted misinformation from some unthinking member of the dental profession. Such material has been used as the basis for articles in popular publications. In discussing these articles with patients who have read them, many dentists, because they have not previously troubled themselves to secure the correct and readily available information from dental periodicals, are unable to correct the wrong impression in the patients' minds.

PROPER VIEWPOINT ESSENTIAL

All practicing dentists must realize the seriousness of the dental health problem facing the public and the profession. Pre-

ventive and control methods are the only logical approaches to the problem, since it will never be possible to keep pace with the present rate of dental caries. The incidence must be reduced appreciably. All proved methods of reducing the incidence of dental caries, especially the fluoridation of municipal waters, must be given serious and continuous consideration by the practitioner. Operative and other treatment services are important, but any practicing dentist who neglects his professional obligations by ignoring dental research and dental health education is a potential liability.

Even though he may not realize it, the practitioner has a large stake in dental public health. Raising the standards of dental health in his community is one of the obligations of a dentist. If he is fully aware of his responsibility in this matter and deliberately ignores the dental health of the community, he is inviting disaster. Sooner or later the public will realize that he is not trying to solve their dental problem and will seek some kind of solution which may be unsatisfactory to both the public and the profession. It will then be too late to correct matters. The dental profession might find itself in a similar situation to that which exists in several other countries.

In this matter of fluoridation it is not sufficient for a practicing dentist to "damn with faint praise" when a patient wishes to discuss the process. He should not pass on to the patient his personal opinions or hastily formed impressions but should use the facts which are readily available to him. By so doing he will be able to take the lead in preventing misunderstanding and confusion and also be instrumental in bringing to his community one of the best procedures yet discovered for control of dental caries.

The very term "profession" implies much more than being an artisan, mechanic, tradesman or laborer. The dental profession should conduct itself accordingly and seek a new fulfillment of its obligation to a society which is clamoring for a solution to the dental health problem.

822 Wood Street

A PUBLIC HEALTH DENTIST'S VIEWPOINT

F. A. Bull, D.D.S., M.S.P.H., Madison, Wis.

The Constitution of the American Dental Association states that the dental profession is dedicated to the improvement of the science of dentistry and the improvement of the health of the public. Therefore, it is the duty of all members of the American Dental Association to give consideration and effort to those factors which affect public health dentistry just as they do to those factors which affect the science and practice of dentistry.

Those who are engaged in dental public health have the added obligation of evaluating research pertaining to dental public health and of stimulating and initiating the adoption of those measures which can improve the dental health of the public on a community basis.

Until recent years there has been no method of preventing dental caries on a mass or public health basis. In spite of all the efforts, dental caries attack rates have been increasing rather than de-

Director of dental health, State Board of Health, Madison, Wis.

creasing. While such measures as oral hygiene practices, restriction of fermentable carbohydrates or improvement of diets held considerable promise, the results, so far as the general public is concerned, have been disappointing. Actually, early and regular dental care has brought about the greatest dental health benefit, but unfortunately this has been necessarily limited to the few.

Public health has made its greatest contribution in the fields where community action has eliminated or greatly minimized the cause of widespread disease. Prevention on a community basis has been the foundation of public health. Water sanitation has practically eliminated typhoid fever; pasteurization has practically eliminated the several milk-borne diseases; immunizations have practically eliminated smallpox and diphtheria, and iodine programs have practically eliminated goiter. These important public health programs, all of a community nature, have formed the solid foundation on which the public health progress of the future can be built.

The fluoridation of public water supplies is destined to go down in history as one of the great public health measures of all time—alongside the afore-mentioned public health programs.

THE PUBLIC HEALTH APPROACH

To many members of the dental profession the public health approach to the dental health problem is something new. The present fluoridation program has given dentists their first opportunity to offer a preventive for dental caries which makes possible mass control in a large segment (60 per cent) of the population. Now that prevention of dental caries is possible on a public health basis it would be well to recall the history of the earlier public health measures and see how much scientific data, human experience, degree of acceptance or opposition these public health measures had, and then compare the present fluoridation program with them.

Such a historical review and comparison may be summarized as follows:

1. No public health program at the time of introduction ever had as much scientific data based on human experience as is now possessed in the fluoridation program.

2. Decisions on all existing public health programs were made following discussion and debate relative to the advantages and disadvantages inherent in the program. With the fluoridation program no valid disadvantage or objection has been proved even after six years of fluoridation.

3. All past public health programs were initiated at the local or community level many years before they had approval on a national level. This has been true of the fluoridation program.

4. All public health programs had a great deal of opposition at the time they were instituted, and most of them still have considerable opposition even though they have been in successful operation for 20 to 40 years. One hundred per cent approval has never been achieved with any past public health program and cannot be expected in the present program of water fluoridation.

The evidence for the use of fluoridation as a public health measure has now reached the stage where the U. S. Public Health Service, the American Dental Association, the American Public Health Association, the American Waterworks Association, the State and Territorial Health Officers and a majority of the state dental societies and health departments are officially recommending it as a public health program. In other words, fluoridation now has national approval. The fluoridation demonstrations that have been carried on successfully for five to six years at Grand Rapids, Mich., Newburgh, N. Y., Sheboygan, Wis., Brantford, Ont., Canada, and Marshall, Texas,

were instrumental in bringing about this national approval.

However, there is one thing that stands out in the minds of all public health workers and that is that resolutions, policies, or statements of fact, by themselves, have never improved the health of the public. It is only when the presentation of the facts affects the attitude or feeling of the public that it is possible to bring about an improvement in public health.

Even when there is no real opposition to a public health program the status quo is a factor to be reckoned with and this factor is difficult to overcome. Hence it is important that city officials, influential citizens and the press be given factual information about fluoridation and what it means in terms of improved dental and general health by reducing caries attack rates 60 per cent. This is a new idea to them and they may have many questions to ask about this program before arriving at a decision. Most communities have an earnest desire to do those things which will improve the health of the public, but they are likewise fearful of adopting some program which might eventually prove to be a boomerang.

RESPONSIBILITY OF THE DENTAL PROFESSION

In the presentation of any public health measure to the public, the dental profession, as a leader in public health, must take a definite stand. To say that pasteurization, chlorination, immunization or fluoridation might do some good if the people care to try it is certain to defeat the program. To tell the public that any of these programs are all right, but that there may be some undesirable side effects, is another sure way to defeat any or all of these programs. Using terms such as "medication" or "artificial fluoridation" helps to defeat the program. The minute doubt is created in the minds of the public, any public health program is doomed to failure. The present standards of public health were achieved by telling the public definitely and emphatically what they should do to improve the health of the public, and this is exactly what must be done with the present fluoridation program if the public is to adopt it.

In most communities there is a sincere desire to adopt those measures which will make for better health. The fact that 100 communities in Wisconsin have adopted a water fluoridation program shows what can be accomplished when a proper presentation of this important public health measure is made by the state and local dental societies and state department of health. Such a result cannot be brought about simply by passing resolutions favoring fluoridation. The public must be educated as to what fluoridation of their public water supply can do to prevent dental caries in future generations and that it is their responsibility to enact such a program. There has been some complaint that the dental profession has done little in the way of prevention of dental caries on a public health basis. Now that a public health measure such as fluoridation is possible which will prevent about two thirds of the future dental caries where it can be applied, the least the dental profession can do is to show the same leadership, courage and persistence as has been shown when earlier public health measures were inaugurated. As guardian of the dental health of the public the dental profession has an obligation to the public, and that obligation must be discharged in a forthright manner to the end that improved dental health of the public is brought about.

The *American Public Health Association Journal* summarizes the scientific data on water fluoridation editorially in the March, 1951, issue and concludes its findings with these words, "What are we waiting for?"

The local dental society is the dental authority in any community and the local dentists, with assistance from the state

dental society and the state department of health are the ones who must take the initiative in presenting the fluoridation program and they must follow through until it is adopted. Public health personnel cannot and should not attempt to carry out the fluoridation program alone. The local dental society or the local dentists in small communities must initiate the program and then the state dental society and public health personnel can assist them. The attitude and actions of the state dental society and state department of health will have a decided influence on the attitude and action of the local dental society or local dentists. It will require the complete teamwork of the state dental society, local dental society or local dentists and state and local health departments to get the job done effectively. There are three questions the public always asks relative to a public health program. They are (1) How much good can come from the program? (2) How much bad is connected with the program? (3) How much does the program cost? All three of these questions can be answered to the satisfaction of the public with respect to water fluoridation.

One fact that must never be overlooked in public health is the vital interest that the public has in the public health programs. When leadership is not provided by the health professions, the public themselves will take over. Such public health programs as maternal and child health, tuberculosis and cancer control are a few examples of public health programs that were initiated by the public when the health professions failed to provide the leadership that the public believed they had the right to expect.

Costs are always a factor in any community health program and these costs must be borne by the community. Fortunately, most communities have been quick to grasp the economics of water fluoridation. The 8 to 12 cents per capita annual cost for fluoridation is well within the communities' ability to pay. In Wisconsin where 100 communities, some with populations as low as 500 people, have adopted programs of water fluoridation, there has not been a single instance where the cost of fluoridation has acted as a barrier to the program.

From a public health viewpoint fluoridation has many ideal features which are necessary for a successful community health program.

1. It can be carried out in its entirety through existing facilities in any community, large or small, having a public water supply.
2. It requires no special effort or participation on the part of the individuals of a community.
3. The reduction in dental caries (65 per cent) is great enough to warrant its adoption by the community.
4. The cost of the program is so small that it can be justified easily in any community.
5. There are no known objectionable features to a program of water fluoridation.
6. It is a program which can be readily understood by the community.
7. Fluoridation has been in actual operation long enough (six years) to prove that the mechanics and controls are accurate and simple and that equal dental health benefits are obtained with controlled fluoridation as with natural fluoridation.

A community or the public health workers or dentists must never think that once the communal water supply has been fluoridated the whole dental health problem has been solved. Nothing could be further from the truth. In the first place, it will take about 14 years, once a community starts fluoridation, before a two-thirds reduction is brought about in the caries attack rate of the children. In the second place, even after fluoridation has been carried on for a long period of

time, one third of the present dental decay rates will still exist, which means that a big problem is still present to challenge the dental profession. While fluoridation is a big step forward in the prevention of dental caries, it is by no means a complete answer to the dental health problem. However, the fact must never be minimized that fluoridation of public water supplies is the most effective preventive dental health measure known at the present time.

It is the obligation of the dental profession to see to it that all communities fluoridate their communal water supplies. It is likewise their obligation to see to it that all communities have an adequate dental health program and utilize all dental health measures which will improve dental health.

CONCLUSIONS

1. Control of dental caries by water fluoridation is a sound, practical approach to the dental health problem for communities having a public water supply.
2. Fluoridation compares favorably with such great public health programs as pasteurization, chlorination and immunization.
3. Fluoridation has been in operation long enough to prove its simplicity in operation and to show the dental benefits that can be obtained.
4. Fluoridation has approval at the national level.
5. Local dental societies and dentists must initiate the fluoridation program in their communities with assistance from the state dental society and the state department of health.
6. There is no valid objection to the fluoridation program.
7. The cost of water fluoridation has not been a problem.
8. Fluoridation is not the complete answer to the dental health problem—adequate dental health programs are still necessary.
9. "What are we waiting for?"

SUMMARIZATION OF THE SUBJECT

Allen O. Gruebbel, D.D.S., M.P.H., Chicago

A STUDY OF MOTTLED ENAMEL

Dr. McKay reminded us that 50 years ago when he began to take more than a casual interest in dental fluorosis, little was known about at least one of the lesions in enamel. He modestly gave much credit to G. V. Black for his intensive studies. Dr. Black, of course, deserves the credit, but one wonders how much of the glow in his achievements is a reflection of the light generated by Dr. McKay.

Dental fluorosis is the only developmental lesion of the enamel that is endemic; that is, peculiar to a district or class of people. When it was recognized that this abnormal condition was related in some way to environment, the investigation became a typical epidemiologic study. There are a number of classical examples of epidemiologic studies of communicable diseases that students in schools of public health are required to review. The investigations of McKay, Black and Dean and others are equally as exciting,

Secretary, Council on Dental Health, American Dental Association, Chicago.

sound and successful and also could be used as textbook material.

Now that the cause of dental fluorosis is known, it is easy to forget how difficult and frustrating it was to solve the mystery. As Dr. McKay pointed out, even after some element in the drinking water was suspected as the probable cause, it seemed almost impossible to find a common factor because of the many different types of water supplies. The problem of the investigators was made more difficult by the inadequate methods of water analysis.

Apparently the first and most important clue that drinking water was related to the occurrence of dental fluorosis was the increase in defective teeth when the water supply was changed in Britton, S. D., Oakley, Idaho, and Bauxite, Ark. The discovery that fluoride was the offending element became inevitable from that point on. While H. V. Churchill made a major contribution to this discovery, the key to the solution of the problem undoubtedly was the observation that dental fluorosis occurred following consumption of water from one source but not following consumption of water from another source.

In passing, it is of particular interest to note that the people who resided in Bauxite, Ark., consumed water that contained 14 ppm fluorine. With the exception of mottled enamel, there is no evidence of the occurrence of any of the tragic events that the current crop of dissenters are predicting if people drink water containing the small traces of fluoride presently recommended.

As Dr. McKay pointed out, the studies also revealed three extremely important facts:

1. Dental fluorosis is acquired during the period when teeth are being formed.
2. The anomaly is not corrected or repaired by the body.
3. The caries experience is consistently and significantly lower in fluoride areas than in nonfluoride areas.

Dr. McKay paid tribute to H. Trendley Dean, a tribute richly deserved. His exhaustive and brilliant research established beyond question the "fluoride-low caries hypothesis" and the fact that a concentration of 1 ppm fluorine in drinking water is safe and effective.

Among the other important points brought out in Dr. McKay's paper was the evidence that the protective benefits of drinking fluoride water from birth extends beyond childhood. However, additional information is needed to verify the assumption that the benefits of fluoride ingestion during childhood are not diminished during middle and old age.

A number of hypotheses have been suggested to explain the mechanism of fluorine action:

1. Fluoride lowers the solubility of the tooth structure.
2. Fluoride inhibits bacterial or enzymatic processes.
3. Fluoride changes the bacterial flora of the mouth.

Dr. McKay aligns himself behind the theory that fluoride ingestion changes the structure and character of the teeth to make them more resistant to the initial caries attack.

In concluding his presentation, Dr. McKay pointed out that the studies of dental fluorosis have resulted in discoveries of methods for completely preventing the defect and partially preventing another dental disease, both results being obtained by controlled use of the same chemical element.

THE CHEMIST LOOKS AT FLUORIDATION

Dr. Black demonstrated not only a comprehensive knowledge of fluoridation and its chemical implications but also the value of seeking inspiration and knowledge from the literature, the old as well as the new. According to the quotation in Dr. Black's paper, fluoride deficiency

was suggested as a cause for the steadily increasing caries incidence in England more than 60 years ago. Research workers traveled a long way in their investigations before the signpost leading to the main highway was noticed and understood.

Dr. Black presented a review of the properties and uses of the element fluorine and its distribution in water, soil, animals and human beings. The presence of 1 ppm fluorine in sea water may be of great importance in future years because oceans some day may be the source of city water supplies, at least in coastal regions. The need in many cities for new and more abundant sources of water is rapidly becoming a problem for waterworks engineers. When methods are discovered to make sea water fit for consumption by human beings, many cities will have access to a water supply that contains the optimum concentration of fluoride.

When the use of fluorides in drinking water first became an important topic for discussion in dental circles, it was not uncommon to find that even the so-called experts spoke of "fluorination" and "fluoridization." Dr. George B. Denton, the authority on nomenclature of the Association's Central Office staff, analyzed the problem in order to obtain uniform usage in the Association's publications. Dr. Black also gave his explanation of why the addition of fluoride compounds to water is properly termed "fluoridation."

The dental profession is waging a nation-wide campaign to bring the benefits of fluoridation to every community and, in many instances, over the opposition or procrastination of persons who should know better. The results of this work may not be fully appreciated by the present generation. But someday the words of Dr. Black will be quoted just as he quoted the words spoken in 1892 by the physician Sir James Crichton-Browne. Dr. Black, the chemist, said that "the reduction of the incidence of dental caries gives promise of being one of the landmarks in the history of public health, not only in this generation but in this century."

Dr. Black described methods for removing fluorides from water when the concentration is excessive. Severe mottling is as destructive to teeth as is dental caries. Therefore, when the concentration is excessive, defluoridation or a new water supply should be recommended just as strongly as fluoridation is now recommended when fluorine is lacking. The need for removing excessive amounts of fluorides calls attention to the peculiar situation in public health practice in which a chemical substance is added to water in some localities to prevent a disease and the same chemical substance is removed in other localities to prevent another disease.

The technical considerations in selecting fluoride compounds and feeders and in controlling dosage, outlined by Dr. Black, are of particular interest to those responsible for the engineering aspects of fluoridation. Experience has shown that fluoridation can be accomplished with a high degree of safety to waterworks operators and consumers. But this situation exists only because the controls are in the hands of competent and highly skilled supervisors or consultants.

Dr. Black pointed out, as have others, that the optimum fluoride concentration may vary because of differences in the amount of water consumed. Thus far, specific regulations have not been established in this regard. In view of its importance, it would seem to be in order to request the official health agencies to adopt regulations for optimum fluoride concentrations in each state.

In listing the requirements of a fluoridating agent, Dr. Black quoted the suggestions of H. Trendley Dean. The importance of establishing standards and rules of procedure for the guidance of hundreds of persons who some day will be engaged in fluoridation operations is evident.

Dr. Black mentioned briefly the several theories of the mechanism of caries prevention. He expressed considerable interest in studies of dental caries in animals in which the bacteria-free technic is employed. These and similar studies may well provide important clues to the unsolved mystery.

Dr. Black's paper reveals his deep interest in fluoridation as a public health measure. It is good to know that "the chemists of America stand ready, as they always have and always will, to participate . . . in its practical realization." The achievements that led to the adoption of fluoridation were accomplished through teamwork. Progress in the future can best be made on the same basis.

THE PRACTICING DENTIST'S VIEWPOINT

Dr. Nicholson devoted a major portion of his paper to some of the handicaps to the adoption of fluoridation in many communities. Among the handicaps mentioned were inadequate information on the part of many practicing dentists, misleading statements to patients, and criticisms, expressions of alarm and vituperations by self-appointed protectors of the public.

Dr. Nicholson believes that the best counterattack is the dissemination of authentic information from authoritative sources and that the most effective means of dissemination is the practicing dentist who daily sees many people both professionally and as a citizen.

The practicing dentist, Dr. Nicholson stated, is trying to meet the heavy demand for his services. Because his patients need corrective and restorative services, there is little time to participate actively in public health programs. Dr. Nicholson believes that many dentists still are finding it difficult to readjust their thinking and their method of practice to a primary emphasis on the prevention of dental disease rather than on a repair service. Fluoridation and other effective methods for preventing dental disease will be adopted more widely when a greater number of dentists recognize and accept their responsibility in the improvement of the dental health of all members of the community and do not restrict their efforts to their own patients.

Events of recent years have shown that the dental profession through its local, state and national dental societies has recognized the importance of public health services. The adoption by almost all dental societies of resolutions approving fluoridation is a good example. The establishment of the Section on Public Health Dentistry by the American Dental Association is another example. There are others too numerous to mention.

The fact that some dentists are not as progressive as others means only that there are faults still in the system of dental education. The shortcomings of some dentists, mentioned by Dr. Nicholson, are not peculiar to the dental profession. No doubt the same thing can be said of medicine, law, engineering and, in fact, all forms of human endeavor.

THE PUBLIC HEALTH DENTIST'S VIEWPOINT

Dr. Bull opened his discussion by reminding us that, until recently, there was no means for preventing dental caries on a mass or public health basis. He stated that in spite of efforts to prevent caries through oral hygiene measures and diet control, the incidence of dental caries has increased steadily in the nation as a whole.

Dr. Bull also reminded us that the prevention of disease through community action is the fundamental purpose of public health practice. Many diseases that at one time were greatly feared now have been almost eliminated by public health preventive services. Dr. Bull concurred in the prediction made by Dr. Black when he said, "The fluoridation of

public water supplies is destined to go down in history as one of the great public health measures of all time."

Dr. Nicholson's concern regarding the attitude of some members of the dental profession is palliated somewhat by Dr. Bull's contention that "the public health approach to the dental health problem is something new." He explained that "the present fluoridation program has given the dental profession the first opportunity to offer a preventive for dental caries which lends itself to mass control in a large segment (60 per cent) of the population."

Four extremely important considerations were presented by Dr. Bull:

1. Fluoridation has a background of as much or more scientific data based on human experience than other public health programs at the time of their adoption.
2. None of the objections to fluoridation has been proved to be valid.
3. Fluoridation, like other preventive programs, must be in operation for several years before nation-wide acceptance can be expected.
4. All new measures that affect large numbers of people meet with some opposition. Some measures that have been operated successfully for many years are still being opposed.

The experience of Dr. Bull and his associates in Wisconsin, where 100 communities have adopted fluoridation, has demonstrated that this procedure has several ideal features from the public health viewpoint: it permits the utilization of existing facilities in the community; it requires no special action on the part of the citizens; it can be carried out at relatively low cost; it is not difficult to explain to the public, and it can be operated safely and efficiently through the use of standardized equipment and methods.

Dr. Bull cautioned, as have many others, that the public should not be led to believe that fluoridation will solve the total dental health problem. Similarly, it also can be said that the dental profession should not relax its efforts because actually only a beginning has been made in the field of preventive dentistry for large population groups.

Dr. Bull is recognized as one of the first and most enthusiastic advocates of fluoridation. He urged fluoridation long before the results of the trial projects were known, justifying his stand on the basis that fluoridated water has the same effect on teeth as natural fluoride water. Some scientists have said that it would have been tragic had he been wrong. Be that as it may, the evidence now shows that Dr. Bull and his colleagues in Wisconsin were right.

Scientific Advances • Scientific specialists commonly insist that their current investigations are too abstruse, intricate, obscure, to be understood save by the specially trained. The reiteration of this statement, true in itself, has engendered a widespread and dangerous fallacy. Great scientific advances are not now, nor have ever been, of their own nature specially difficult of comprehension. On the contrary, a test of the significance of a scientific doctrine is the degree to which it can be reduced to a simple formula. It is not the positive conquests of science that are peculiarly obscure, but rather the confused yet active battle-front along which science is advancing at any given moment. *Charles Singer, "A History of Biology: A General Introduction to the Study of Living Things," 1950, p. 25.*

Relation of endemic dental fluorosis to malnutrition

Maury Massler, D.D.S., M.S., and Isaac Schour,† D.D.S., Ph.D., Chicago*

The purpose of this study was to examine the possible effects of malnutrition on the response of the developing enamel to water-borne fluorides. This seemed to be of special importance in view of current emphasis on fluoridating the communal water supply as a public health measure.

The relation of nutrition to endemic dental fluorosis was investigated in two Italian communities, Campagnano di Roma and Quarto, as part of the dental research program of the Italian Medical Nutrition Mission conducted in 1945.

CAMPAGNANO DI ROMA

Campagnano di Roma is a community of over 1,000 inhabitants situated about 35 miles northwest of Rome. It is built near the peak of Mt. Rossi. The community is entirely agricultural and supplied with wheat, vegetables and livestock. The average diet during and after World War II was much better than in most areas of Italy because the community was self-sufficient in food. The community was isolated and did not export a great proportion of its food since transportation other than by donkey was uncommon. The average inhabitant ate a good portion of meat at least once a day—a feature not enjoyed by the inhabitants of nearby Rome during and after the war.

The community escaped destruction during the hasty retreat of the Nazis north of Rome. The people were relatively healthy. They were fairly well clothed and were adequately housed. There was a community hospital with modern equipment and roentgenographic machines. A physician residing in the community occasionally extracted teeth.

While the level of nutrition was lower than that in most cities in the United States, it compared favorably with that of communities of similar size in the southeastern part of this country. In 1933 Ricci[1] described in detail the characteristic mottling of the teeth of inhabitants of Campagnano di Roma.

QUARTO

Quarto is a community of about 1,000 prewar inhabitants lying in a valley about

This study was begun in 1945, under the auspices of the Italian Medical Nutrition Mission. Grateful acknowledgement is given to the Unitarian Service Committee, the Congregational-Christian Service Committee and the UNRRA who provided the necessary facilities for this investigation. Dr. S. Fiorentini assisted with the clinical examinations in Campagnano di Roma.

*Professor and head of the department of pedodontics, University of Illinois College of Dentistry, Chicago.

†Professor and head of the department of histology, University of Illinois College of Dentistry, Chicago.

1. Ricci, E. Il fenomeno di "denti screziati" in Italia. Annali di Clinica Odontoiatrica 21:1029, 1933.

15 miles from Naples and separated from the Mediterranean Sea by rocky hills. The young adult male population was much reduced during the war. The community was entirely agricultural but raised little besides apples. The people lived in the village but worked outside the village in orchards belonging to wealthy landowners. The economic status and the standard of living were low. The housing was poor and the roads were almost impassable after rains. Because of its strategic military position, the town changed hands many times during the war and suffered considerable damage and losses in men, crops and livestock. The people were poorly clothed and lived in hovels.

Signs of malnutrition were apparent in practically all of the people (Table 1). Evidence of frank rickets, pot-bellies in children, dry, scaly skin with multiple sores, angular cheilosis and raw, red fissured tongues was found in practically all the inhabitants of this region by simple inspection.

In both Campagnano di Roma and Quarto, the water supply was obtained from a village well. In both communities the impression was that the average water intake was somewhat less than the average intake in the United States. In both communities mottling of the teeth was prominent.

Nearly all the school children from 6 to 14 years of age were examined in both communities. A representative number of adults in all age groups were examined also in order to obtain a better picture of the problems presented.

Table 1 • Prevalence of malnutrition in Campagnano di Roma and in Quarto

Nutritional status	Campagnano di Roma		Quarto*
	Adults† %	Children 6-14 yrs. %	Children 6-14 yrs. %
Good nutrition	78.0	32.0	1.5
Subnutrition	2.0	14.0	2.9
Malnutrition—mild	18.0	30.0	39.7
Malnutrition—moderate	2.0	20.0	44.1
Malnutrition—severe	0.0	4.0	11.8

*Samples of adult population too small to be included in the table.
†Based on clinical examination and appraisal of 50 adults by Frank Gollan, M.D.

METHODS AND MATERIALS

The oral examinations were made in good natural light with the use of an explorer and a mouth mirror.

Number of Persons Examined and Their Age Range • An oral examination with assessment of the prevalence and degree of severity of endemic dental fluorosis was made in 628 individuals who had lived in Campagnano di Roma since birth. Their ages ranged from 2 to 60 years (Table 2). In Quarto, 300 inhabitants who had resided there since birth, were examined. They were from 6 to 20 years of age (Table 2). In both communities, nearly all the children attending school from 6 to 14 years of age were examined.

Index of Dental Fluorosis • The degree of severity of endemic dental fluorosis was recorded in six classes. These corresponded closely with the criteria and values employed by Dean[2] in establishing an index of dental fluorosis (Tables 2 and 3).

Classification of degree of mottling	Numerical value according to Dean, 1942
O No mottling present or questionable mottling	0
I Very mild	1
II Mild	2
III Moderate	3
IV Moderately severe (Dean's revised moderate)	3
V Severe	4

2. Dean, H. T. The investigation of physiological effects by the epidemiological method. In Fluorine and dental health, Moulton, F. R., editor. Lancaster, Pa., American Association for the Advancement of Science, 1942.

Table 2 • Distribution and index of endemic dental fluorosis in Campagnano di Roma and in Quarto

		Percentage of persons in each category						
Campagnano di Roma		Degree of mottling						Index of fluorosis*
Age in years	Number persons examined	None	Very mild	Mild	Moder-ate	Moder. severe	Severe	
		0	1	2	3	3	4*	
2-5	24	100	0.0	0.0	0.0	0.0	0.0	0.0
6-8	56	10.7	19.7	46.6	17.7	5.3	0.0	1.8
9-11	69	0.0	5.8	56.5	36.3	1.4	0.0	2.3
12-14	77	0.0	5.2	37.7	53.2	3.9	0.0	2.52
15-20	99	0.0	2.0	28.1	64.4	5.5	0.0	2.67
21-30	135	0.0	2.9	22.2	57.8	17.1	0.0	2.72
31-40	87	0.0	2.3	20.7	40.2	34.5	2.3	2.77
41-50	54	0.0	1.8	5.5	31.5	57.5	3.7	2.95
51-60	27	0.0	0.0	11.1	18.5	66.7	3.7	2.93
Total	628							
Fluoride content of water supply—3.5 ppm Nutritional status of population—Fair								
Quarto								
6-8	95	54.7	32.6	7.4	4.2	0.0	1.1	0.64
9-11	133	35.3	33.1	14.3	10.6	4.5	2.2	1.16
12-14	48	39.7	22.9	16.6	10.4	8.3	2.1	1.2
15-20	24	20.8	29.2	4.2	45.8	0.0	0.0	1.7
Total	300							
Fluoride content of water supply—1.3 ppm Nutritional status of population—very poor								

*Values assigned according to Dean, 1942.

Fluorine Content of Water Supply • Samples of the communal water supply were obtained and shipped to H. Trendley Dean who arranged for the chemical analysis for fluorine by Elias Elvove. McClure and Likins[3] analyzed the fluorine content of the enamel and dentin of 8 teeth extracted from persons living in Campagnano di Roma.

Nutritional Status • The general appraisal of nutrition was based on estimates of dietary intake and on clinical examinations. For the groups of children in Quarto who were studied for statistical correlation between nutrition and endemic dental fluorosis, the nutritional status was estimated on the basis of stature and the Wetzel grid.[4]

GENERAL NUTRITIONAL STATUS

The nutritional status of each individual was assessed as part of the total clinical examination (Table 1).

The adult population in Campagnano di Roma showed, for the most part, good nutritional status. The children of Campagnano di Roma who underwent part of their growth during the war period showed an increased incidence of malnutrition. The children in Quarto showed a much higher degree of malnutrition (Table 1).

3. McClure, F. J., and Likins, R. C. Fluorine in human teeth studied in relation to fluorine in the drinking water. J. D. Res. 30:172 (April) 1951.

4. Wetzel, W. C. Physical fitness in terms of physique, development, and basal metabolism. J.A.M.A. 116:1187 (March 22) 1941.

In both Quarto and Campagnano di Roma, the major nutritional disturbances were deficiency in vitamin B complex, rickets, protein deficiency and low caloric intake. Vitamin B deficiencies were evident on the basis of pellagrous skin, glossitis, cheilosis, purse string mouth and injection of the sclera. The severity of the deficiencies was much greater in the children of Quarto than in those of Campagnano di Roma.

Rickets was prevalent in spite of "sunny" Italy. The scarcity of milk and the subsequent lack of calcium may explain this fact in part. Fat intake was extremely low. Eggs were almost unobtainable.

Protein deficiency was evident in the stunted growth of the children. The protein intake was largely vegetable protein.

The caloric intake was minimal. In the spring of 1946 the average daily per capita intake in Italy in areas reached by UNRRA supplies was 1,300 calories. Neither Quarto or Campagnano received UNRRA supplies. The caloric intake in Quarto was below 1,000 calories per person per day.

The water analysis showed a low iodine content of approximately 2 micrograms per liter.[5] This was reflected in the common presence of thyroid enlargement.

OBSERVATIONS

Fluorine Content of Communal Water Supplies • The water supply in Campagnano di Roma contained 3.5 ppm of fluorine while the water supply in Quarto contained 1.3 ppm of fluorine. Chemical analyses of similar samples made by Murray and Wilson[5] of the University of London showed an essentially similar fluorine concentration.

Prevalence of Dental Fluorosis • Mottling was widely prevalent in both Campagnano di Roma and in Quarto. It was difficult to discover an adult who did not have mottled enamel. In the 12 to 14 year old age group, the prevalence of mottling was 100 per cent in Campagnano di Roma and 60 per cent in Quarto (Table 2). This seemed high in view of the concentrations of fluorine in the water supply of these communities. Comparison of prevalence rates with cities in the United States having equivalent amounts of fluorine in the water supply showed a much higher prevalence of mottling in the two Italian communities (Table 3).

Table 3 • Index of dental fluorosis in children 12 to 14 years of age* residing since birth in Campagnano di Roma and in Quarto compared with findings in two communities in the United States with comparable fluorine concentration in the communal water supply

	Italy	U. S.†
	Quarto	Joliet, Ill.
F content of water supply in ppm	1.3	1.3
Percentage of children with mottling	60.0	25.3
Index of dental fluorosis	1.20	0.46
Nutritional status of population	Very poor	Good
	Campagnano di Roma	Conway, S. C.
F content of water supply in ppm	3.5	4.0
Percentage of children with mottling	100.0	88.2
Index of dental fluorosis	2.52	2.10
Nutritional status of population	Fair	Good

*Only 12 to 14 year old children are compared since the index of endemic dental fluorosis in the United States has been reported only for this age group (Dean, 1942).
†Data from Dean, 1942.

Index (Degree of Severity) of Endemic Dental Fluorosis • It is known that the deciduous teeth are rarely affected by fluorides except in high concentrations. In Campagnano di Roma, the index of mottling in the group 2 to 5 years of age, with only deciduous teeth present, was

5. Murray, M. M., and Wilson, D. C. Fluorosis and nutrition in Morocco. Brit. D. J. 84:97 (March 5) 1948.

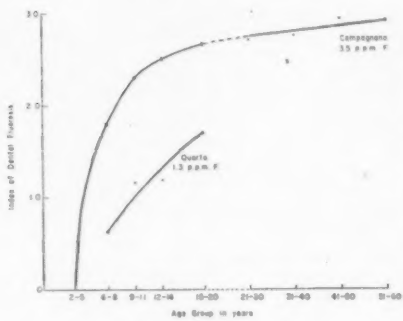


Fig. 1 • Increase in the index of dental fluorosis with age in Campagnano di Roma and in Quarto

zero. The index was 1.8 in the 6 to 8 year old age group. It rose with increasing age, reaching 2.9 in the 50 to 60 year old age group (Table 2 and Fig. 1).

Increase of Discoloration With Age • Table 2 indicates that the severity of mottling increased with age. This was probably the result of exposure of the imperfectly calcified enamel to the oral fluids resulting in secondary discoloration. Ricci[1] pointed out that in Campagnano di Roma the discoloration was darker and more pronounced in men than in women. He attributed this difference to the fact that women did not smoke and used dentifrices more frequently.

Comparison of Mottling in Italian and American Children • Tables 3 and 4 show that the index of endemic dental fluorosis for children 12 to 14 years of age was 2.5 in Campagnano di Roma and 1.2 in Quarto. These data are contrasted by an index of 0 for children born and raised in Naples which has a concentration of 0.2 ppm of fluorine in its water supply. However, endemic areas in the United States with a content of 1.3 ppm of fluorine in the water usually show an index of approximately 0.5 while areas with 4.0 ppm of fluorine show an index of 2.0 (Table 3).[2] This indicates that mottling was much more severe in the two Italian cities than in the American cities with equivalent amounts of fluorine in their water supply.

It must be emphasized that, on the average, the water intake was much lower in the Italian children than in American children. An increased intake of fluorine-containing water by the Italian children could not be held to account for the increased mottling. The only discernible reason for the increased prevalence and the increased severity of the mottling in the Italian cities was the fact that malnutrition was much more severe in the Italian children and the adults than in the United States (Fig. 2).

This thesis was further supported by the observation that the percentage of moderately severe and severe degrees of mottling was higher in Quarto than in

Table 4 • Comparison of the distribution of different degrees of mottling in children ages 12 to 14 years residing in Campagnano di Roma and in Quarto

		Percentage of persons affected							
	Number of persons examined	Degree of mottling						Fluorine content of water supply in ppm	Nutritional status of population
		None	Very mild	Mild	Moderate	Moder. severe	Severe		
Quarto	48	39.7	22.9	16.6	10.4	8.3	2.1	1.3	Very poor
Campagnano di Roma	77	0.0	5.2	37.7	53.2	3.9	0.0	3.5	Fair

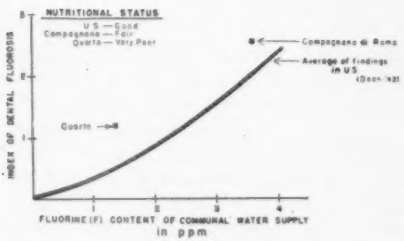


Fig. 2 • Relation of the fluorine content of the communal water supply to the degree of mottling as indicated by the index of dental fluorosis in American children aged 12 to 14 years (from Dean, 1942). Note that the index of dental fluorosis in children 12 to 14 years old living in Campagnano di Roma and in Quarto was significantly higher than in American communities with comparable fluorine concentration in the water supply (see also Table 3)

Campagnano in spite of the fact that the fluorine content of the water was lower. This might well have been the result of the greater degree of malnutrition in Quarto.

It is important to note also that McClure and Likins[3] found a much higher content of fluorine in the enamel and dentin of teeth obtained from Campagnano di Roma as compared with teeth obtained from analogous endemic areas in the United States having a fluorine content of 3.5 ppm or more in their water supply. This further supports the observation of an increased degree of fluorosis in areas of malnutrition.

These comparisons and the data in Table 3 indicate that malnutrition tends to increase the severity of the mottling resulting from more than 1.0 ppm of fluorine in the water supply.

Correlation of Nutritional Status with Endemic Dental Fluorosis • In order to test the relation between malnutrition and fluorosis on an individual basis, rather than on a grossly comparative basis, Yule's[6] modification of Pearson's coefficient of mean square contingency was employed and the coefficient of association betwen these two factors was determined in the children of Quarto and Campagnano. For this purpose, children aged 9 to 11 were chosen since the incisors were newly erupted and relatively unaffected by intraoral pigmentations. Of greater importance in selection of this age group was the fact that the effect of the fluorides on the enamel occurs during the period of formation and calcification of these teeth (3 months to 6 years of age). Data as to the nutritional status of each child during tooth development were unreliable so that assessments of nutritional status had to be made at the youngest age level commensurate with the clinical assessment of the degree of mottling. The age group 9 to 11 years came closest to these requirements.

Figure 3 gives the degree of association between nutritional status as reflected by understature, and the degree of mottling. There is a tendency for the more advanced degrees of mottling to occur in

6. Yule, G. U., and Kendall, M. G. An introduction to the theory of statistics, ed. 12. London, J. B. Lippincott Co., 1940, p. 68, 69.

STATURE	DEGREE OF MOTTLING 0	I	II	III	IV	V	
VERY TALL	1	1					2
TALL	4	2			1		7
AVERAGE	12	11	5	4	1		33
SHORT	6	9	3	4	1	1	24
VERY SHORT	7	3	1	1		.	12
	30	26	9	9	3	1	78

Coefficient of Association = 0.361

Fig. 3 • Correlation between the degree of mottling and stature of 78 children aged 9 to 11 years residing in Quarto

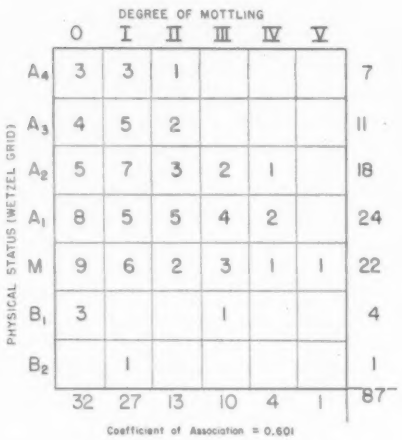

DEGREE OF MOTTLING
0 I II III IV V
PHYSICAL STATUS (WETZEL GRID)
A4 3 3 1 7
A3 4 5 2 11
A2 5 7 3 2 1 18
A1 8 5 5 4 2 24
M 9 6 2 3 1 1 22
B1 3 1 4
B2 1 1
32 27 13 10 4 1 87
Coefficient of Association = 0.601

Fig. 4 • Correlation between the degree of mottling and physical status (as determined by the Wetzel grid) of 87 children aged 9 to 11 years residing in Quarto

understatured children. The coefficient of association is equal to 0.36 where perfect agreement would be 0.9 and no agreement would be 0.

In Figure 4, nutritional status was estimated according to the Wetzel grid.[4] There was a tendency for the more severe types of mottling to appear among the children with a lower weight: height ratio. The coefficient of association was equal to 0.6 where perfect agreement would be 0.9 and no agreement would be 0.

It is possible that the association between the degree of malnutrition and the severity of mottling was not higher than indicated only because the nutritional status of the child was assessed long after the period of enamel formation and calcification was completed, rather than at the time of enamel calcification. Nonetheless, the association was strongly positive and supports the hypothesis that children with a lower nutritional status tend to have more severe mottling than do those enjoying a higher nutritional status.

DISCUSSION

Malnutrition and Mottling • Quarto, with a fluorine content in the water supply of 1.3 ppm, showed, for the age group of 12 to 14 years, a prevalence which was more than twice as high as and an index which was 100 per cent higher than that found in the same age group at Joliet, Ill., also with 1.3 ppm of fluorine (Table 3). Again, for the group 12 to 14 years of age, Campagnano di Roma, with 3.5 ppm of fluorine in the water, showed a 10 per cent higher prevalence and a 20 per cent higher severity of dental fluorosis than Conway, S. C., with 4.0 ppm (Tables 3 and 4). The higher index of mottling in Italy may be explained on the basis of differences in nutritional status. It appears that as the nutritional status is lowered, the cells (ameloblasts) which are responsible for the formation and calcification of the enamel become more susceptible to the deleterious action of fluorine.

This thesis, that malnutrition accentuates the severity of the mottling, is further borne out by the fact that the increase in the prevalence and severity of endemic dental fluorosis in Quarto as compared with Joliet was much greater than the increase in Campagnano di Roma as compared with Conway. This again points to the significant role of malnutrition in mottling since the malnutrition was more severe in Quarto than in Campagnano di Roma. Further, the observation showed the percentage of persons with severe mottling was greater in Quarto than in Campagnano di Roma in spite of the fact that the fluorine content of the water supply was much lower (1.3 ppm as against 3.5 ppm). The indications are that the lower nutritional status increased the severity of endemic dental fluorosis even more than it did its prevalence.

The observation that malnutrition acts as an aggravating factor in endemic dental fluorosis confirms a number of similar

reports in the literature (Day,[7] Pandit,[8] and others, Murray and Wilson[5]).

Weaver[9] does not support this thesis on the basis of examination of children living in Tyneside. However, he also found no relationship between caries experience and mottling so that this group may not be comparable to groups studied in the United States and in Italy where a distinctly inverse relation exists between caries and mottling.

Pandit[8] and co-workers found that in severely malnourished children, even the deciduous teeth showed signs of mottling although these teeth are normally unaffected by the fluorides ingested by the mother. Mottled enamel was universal at 1.0 ppm of fluorine or more. At a level of 6.0 ppm of fluorine, the bones and joints were affected in malnourished persons exposed to this concentration for 15 years or more.

Murray and Wilson[5] presented striking evidence of the role of malnutrition in increasing the index of mottling in fluoride endemic areas. They observed that mottling of the enamel in children from low economic levels and deficient nutrition was severe while mottling was absent in children residing in the same endemic community who enjoyed adequate nutrition.

It is not yet clear whether the accentuated mottling of the enamel was the result of specific nutritional deficiencies or of a generally lowered nutritional status. Different investigators have implicated deficiencies in vitamin A, vitamin C, calcium and iodine as the aggravating factors in endemic dental fluorosis.

Vitamin C and Fluorosis • The evidence on the possible relation between vitamin C and fluorosis is contradictory. Leverton and Smith[10] and Pandit[8] observed a more severe type of mottling in children who had a low intake of vitamin C. Pandit[11] confirmed this observation in two experimental monkeys.

On the other hand the administration of vitamin C did not lessen the severity of the effects of fluorides in rats (Smith,[12] Ranganathan[13]).

In both Campagnano di Roma and Quarto the vitamin C intake was adequate. This fact suggests that an adequate intake of vitamin C by itself is not sufficient to counteract the toxic effects of fluoride.

Iodine and Fluorosis • Iodine deficiency had been suspected as an aggravating factor in dental fluorosis since some communities happened to be endemic both for fluorosis and thyroid enlargement. The water of both Campagnano di Roma and Quarto had a low concentration of iodine, about 2 mg. per liter (Murray and Wilson),[5] and a correspondingly high incidence of goiters. However, there was no correlation between the degree of thyroid enlargement and the index of fluorosis. Hatfield[14] and co-workers found that supplementary iodine did not counteract the effects of fluorides in sheep which had been on iodine-deficient rations.

Calcium and Fluorosis • In contrast to the inconclusive data on the role of vitamin C and of iodine deficiencies in aggravating the effects of fluorides, there is general agreement in the literature

7. Day, C. D. M. Chronic endemic fluorosis in northern India. Brit. D. J. 68:409 (May 15) 1940.

8. Pandit, C. G., and others. Endemic fluorosis in south India. Study of factors involved in production of mottled enamel in children and severe bone manifestations in adults. Indian J. M. Research 28:533 (Oct.) 1940

9. Weaver, Robert. Fluorosis and dental caries in Tyneside. Brit. D. J. 76:29 (Jan. 21) 1944.

10. Leverton, R. M., and Smith, M. C. The relation of calcium and phosphorus in the diet to the cause of mottled enamel of human teeth. J. Home Econ. 24:1091, 1932.

11. Pandit, C. G., and Narayana Rao, D. Endemic fluorosis in south India. Experimental production of chronic fluorine intoxication in monkeys (Macaca Radiata). Indian J. M. Research 28:559 (Oct.) 1940.

12. Smith, M. C. Dietary factors in relation to mottled enamel. J. D. Res. 15:281 (Sept.) 1936.

13. Ranganathan, S. Calcium intake and fluorine poisoning in rats. Indian J. M. Research 29:693 (Oct.) 1941.

14. Hatfield, J. D., and others. Iodine-fluorine relationships in sheep nutrition. J. Anim Sc. 3:71, 1944.

that calcium deficiency does increase the severity of the manifestations of fluoride intoxication. Ranganathan,[15] experimenting with rats in 1944, found that a calcium deficiency superposed on a diet containing fluorides increased the toxic effects of the fluorides and resulted in a noticeable reduction in the survival of the animals.

In Italy as a whole, but particularly in Quarto, calcium intake was scant, since milk as a source of calcium was not readily available. The increased prevalence and especially the increased severity of mottling in Quarto as compared with Campagnano di Roma could be explained on the basis of the much lower calcium intake in Quarto. The same is probably true of the much more severe mottling generally observed in Italy as compared with the United States.

Protective Action of Calcium • The protective action of calcium against the effects of fluorides has been reported by Ranganathan,[15] Shourie[16] and by Irving.[17] Greenwood[18] and others found that permanent teeth of puppies fed 5 mg. of fluorine per kilogram of body weight daily as sodium fluoride stored excessive fluorides and showed evidence of dental fluorosis, while puppies receiving the same level of fluorides in bone meal powder and in defluorinated phosphate had sound normal teeth. The addition of calcium in the bone meal apparently had a protective action against dental fluorosis.

Hoffman, Schuck and Furuta[19] observed that fluorides administered in the milk fed to the rats resulted in much fewer dental changes when compared to the effects of fluorides administered through water.

Thus there is little question that fluoride metabolism and the metabolism of calcium and phosphorus are closely interdependent (Hauck, Steenbock and Parsons,[20] Morgareidge and Finn,[21] Ranganathan[15]). It may be concluded that an adequate diet high in calcium is a protective measure against excessive severity of mottling of the enamel.

Importance of Investigations of Nutritional Status • The data from this and other investigations suggest that malnourished infants and children, especially if deficient in calcium intake, may suffer from the effects of water containing fluorine while healthy children would remain unaffected. It is possible that the small proportion of individuals who show some, though slight, endemic dental fluorosis in communities with only about one part per million of fluorine in the water supply do so because of insufficient intake of calcium or because of disturbances in calcium metabolism.

Thus low levels of fluoride ingestion which are generally considered to be safe for the general population may not be safe for malnourished infants and children. Therefore, the nutritional status must be carefully assessed and guarded in areas with endemic fluorosis. Nutritional studies should be included in any comprehensive program of fluoridation of water with special attention to chronically ailing infants and children.

Chemical Analysis of Teeth of Residents of Campagnano di Roma • McClure and

15. Ranganathan, S. Studies on experimental fluorine poisoning in rats. Indian J. M. Research 32:233 (Oct.) 1944.

16. Shourie, K. L. Calcium:fluorine ratio and acute and chronic fluorine toxicosis and dental caries in hamsters and rats. (Abst.) J. D. Res. 27:732 (Dec.) 1948.

17. Irving, J. T. Action of fluorine on the teeth of rachitic rats. Nature, London, 158:949 (Dec. 28) 1946.

18. Greenwood, D. A., and others. Comparative studies of feeding of fluorides as they occur in purified bone meal powder, defluorinated phosphate and sodium fluoride, in dogs. J. D. Res. 25:311 (Oct.) 1946.

19. Hoffman, M. M.; Schuck, C., and Furuta, W. J. Histologic study on effects of fluorine administered in dry and moist diets on teeth of young albino rat. J. D. Res. 21:157 (April) 1942.

20. Hauck, M. M.; Steenbock, H., and Parsons, H. I. Effect of level of calcium intake on calcification of bones and teeth during fluorine toxicosis. Am. J. Physiol. 103:489 (Feb.) 1933.

21. Morgareidge, K., and Finn, S. B. Effect of fluorine on activity of vitamin D in rachitic rats. J. Nutrition 20:75 (July) 1940.

Likins[3] showed that the fluorine content of the enamel and dentin of permanent teeth extracted from Campagnano di Roma adult natives was much higher than would be expected on the basis of the degree of mottling and on the basis of the fluorine content in the water supply. They considered it likely that the drinking water had a higher fluorine content during some earlier period. They also considered the possibility that the scarcity of milk led to a greater intake of water. The disproportionately increased fluorine content in the enamel and dentin of these teeth may be best explained on the basis of the lowered nutritional status and calcium intake in Campagnano di Roma.

SUMMARY

The prevalence and severity of endemic dental fluorosis were studied in 928 undernourished inhabitants who had resided since birth in two fluoride endemic areas in Italy (Campagnano di Roma and Quarto). The data were compared with the index of mottling found in endemic areas in the United States with similar fluorine concentration in the water supply.

The relative nutritional status in Campagnano di Roma was fair, and in Quarto, poor, in comparison with that of American communities which was considered to be good.

1. The prevalence of mottling—that is, the number of individuals affected—was higher in the Italian communities than in comparable areas in the United States with similar fluorine content in the water supply.

2. The severity of mottling of the enamel as evidenced by the index of endemic dental fluorosis was noticeably higher in the Italian communities than in comparable areas in the United States.

3. The difference may be explained on the basis of the lower nutritional status of the groups studied, the most important factor being probably a lower calcium intake. The children in Quarto and Campagnano di Roma were poorly nourished from birth in comparison with the children in the American communities. Rickets was prevalent.

CONCLUSIONS

1. The nutritional status of the population, especially the calcium intake, affects the prevalence and degree of mottling caused by the fluorine concentration in the water supply. The poorer the nutritional status and the lower the calcium intake, the more prevalent and more severe the mottling.

2. The degree of mottling in any given individual may be an indicator not only of the concentration of fluorine in the water ingested during the period of formation and calcification of the enamel but also of intercurrent systemic disturbances. When an individual or a population group shows mottling beyond the degree expected, the health and nutritional status of that group should be investigated.

Diagnosis and treatment of fractured anterior teeth

Naomi A. Dunn, D.D.S., and Irving W. Eichenbaum, D.D.S., New Britain, Conn.

Any treatment plan for the preservation of traumatized permanent anterior teeth must of necessity be based on several factors. Of primary importance is the maintenance of the dental structures, either in a vital or nonvital state, in such a manner as to render them useful members of the dental mechanism. Secondly, the proper physical restoration of the injured tooth involves what Ellis[1] calls "the psychologic well-being of the individual." He[1] discusses this facet of the problem thus: "Too frequently the dentist considers only the loss of the physical structure of the tooth and fails to recognize the possible mental implications inherent in unsatisfactory treatment or lack of treatment."

The prevalence of fractured anterior teeth is increasing. Zander and Law[2] referred to this situation several years ago. This may be due to the present traumatic age or perhaps the problem has received increased attention from the dental practitioner. Orthodontists, in particular, have long realized that a large percentage of these fractures occur in youngsters with the protruding Class II Type I (Angle) dentition. Much certainly can be said in favor of early treatment of these malocclusions in order to prevent severe injury to the teeth.

In the event a young patient comes to the dental office, the victim of an accident involving an anterior tooth, the practitioner assumes a tremendous burden of responsibility either by accepting or refusing to accept the case for treatment. It is the purpose of this paper to present a logical plan of diagnosis and treatment in order, if possible, to reduce the number of lost teeth.

The first and a most important phase of treatment is the taking of a complete and detailed history and several satisfactory roentgenograms.[3] These roentgenograms should include at least two adjacent teeth on either side of the injured one. The clinical examination should be minute and a record made of all possible data so as to evaluate properly the extent of the injury. The reactions of the tooth to the vitality test, thermal changes and percussion, have a bearing on the plan of treatment. Roentgenograms are vital for they, above all, will give the operator an opportunity to interpret clearly the state of development of all the dental tissues involved. Only through an accurate roentgenographic study can one determine the approximation of the physiologic and chronologic ages. With the foregoing as background,

1. Ellis, R. G. The classification and treatment of injuries to the teeth of children, ed. 2. Chicago, Year Book Publishers, 1946, p. 15.

2. Zander, H. A., and Law, D. B. Pulp management in fractures of young permanent teeth. J.A.D.A. 29:737 (May) 1942.

3. Brauer, J. C. The treatment of children's fractured permanent anterior teeth. J.A.D.A. 41:399 (Oct.) 1950.

the injury can be placed in a given category and treatment initiated.

Four degrees of injuries will be discussed and for purposes of standardization, the classification advanced by R. G. Ellis[1] will be used.

Class I fractures are those where a small amount of enamel has been removed by the force of the blow and no dentin is exposed.

Class II fractures are those where enamel and dentin have been removed by the trauma but there is no pulp exposure.

Class III fractures are those where the traumatic incident has removed sufficient tooth structure to expose the pulp.

Class IV injuries involve teeth that lose their vitality, usually with no loss of tooth tissue.

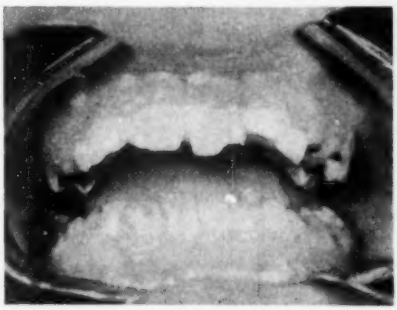


Fig. 1 • Characteristic Class I fracture with rough enamel margins which are irritating to the lips and tongue

CLASS I

In this type of injury the patient is usually troubled only by the sharp or uneven enamel edges and will voluntarily seek dental care to "smooth the chipped tooth." All dental procedures at this time are performed with a view to the protection of this tooth from further injury or adverse oral or thermal stimuli. The rough edges of enamel are gently disked and polished and the treatment terminated with the taking of several roentgenograms. This is done to determine any injury to the root portion of the tooth. Infrequently, a number of teeth with slight external damage and severe root fracture will be found. However, Class I injuries are usually minor in nature and no irreversible necrotic reaction is set up in the pulp itself. In about 8 to 10 weeks, these teeth must be re-examined clinically and roentgenograms taken. In a significant number of instances, while the blow was insufficient to cause much tooth loss, the pulp tissue became nonvital soon after the accident and the condition manifested itself later on. Figure 1 is a Class I type of fracture. The enamel had been lost and this patient sought dental attention one week after the accident to relieve the saw-tooth edge of enamel. The postoperative course was uneventful and films taken at two month intervals confirmed the prognosis. Figure 2 illustrates more extensive damage. The treatment, however, is essentially similar to that used in the previous case. As can easily be understood, the largest majority of persons with this class of injury are not seen by the dentist and treatment, if any, is essentially making the tooth comfortable to the tongue and as esthetic as a small amount of grinding will allow.

CLASS II

The greatest number of injured anterior teeth seen in the dental office are of the Class II type (Fig. 2). Varying amounts of enamel and dentin are removed by the force of the blow but the pulp tissue is covered by a layer of dentin. Frequently the dentin remaining is extremely thin and the pulp horn may be seen clearly; however, there is no actual opening made to the pulp tissue.

The prime objective of treatment for this class of injury is the protection of the pulp tissue from any further stimuli, usually thermal in nature. The ability of

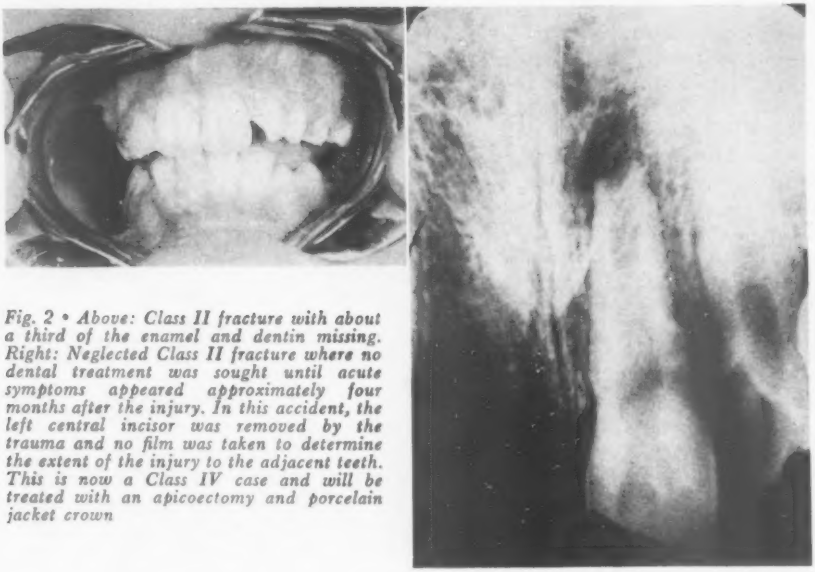


Fig. 2 • Above: Class II fracture with about a third of the enamel and dentin missing. Right: Neglected Class II fracture where no dental treatment was sought until acute symptoms appeared approximately four months after the injury. In this accident, the left central incisor was removed by the trauma and no film was taken to determine the extent of the injury to the adjacent teeth. This is now a Class IV case and will be treated with an apicoectomy and porcelain jacket crown

this pulp to survive the shock and recover and maintain its vitality is directly proportional to the size of the apical opening of the root canal. The extreme vascularity of the young adult pulp greatly enhances its chances of survival and certainly the preservation of the vitality of this tooth should be the prime objective. Therefore, every step in the technic of treatment should be palliative and nonirritating. The tooth should be isolated with cotton rolls and washed with warm sterile water and dried with cotton. The exposed dentin should then be covered with a thin mix of an obtundent paste. No pressure should be exerted in the placement of this or any other material on the tooth. A thin mix of cement is flowed over this obtundent paste and is allowed to set hard before the next step is undertaken. The purpose of this "roof" of cement is to prevent the transmission of any pressure to the dentin overlying the pulp when the celluloid crown is seated. A resin crown form is contoured to fit the gingival tissues. The occlusion and various mandibular excursions are checked to eliminate any interference during mastication. Any occlusal disharmony, even in this temporary restoration, may predispose to failure. Two small bur holes are placed at the linguoincisal edge, mesially and distally, and the crown form set with zinc oxyphosphate cement. Great care must be exercised to remove any excess from beneath the free margin of the tissues. The patient is dismissed for 8 to 10 weeks. At this time, if roentgenographic evidence permits, a more permanent and esthetic restoration, the cast three-quarter crown, may be considered.

The advantages of placing cast gold restorations[3] on these teeth are many. This type of replacement appears to offer the maximum protection and the esthetic requirements are easily met. Also, the retentive qualities of a properly prepared and cast gold crown are superior to any other replacement attempted. There are

some instances where appearances are of utmost importance and acrylic shoulderless crowns are used; however, these are limited in number. Acrylic jacket crowns need additional retention and prior to the cementation of the finished crown a short piece of 18 gage wire is set into a small pit in the dentin in the missing section of the tooth. A suitable relief is then prepared in the crown and the restoration usually will be satisfactory as a temporary measure.

The most successful treatment used to date is a cast, three-quarter crown with the missing portion of enamel replaced with one of the new plastic filling materials. The mesial and distal slices are placed just through the contacts, entirely at the expense of the lingual surface. These slices are used merely to establish a sound gold margin as the retentive features are based on one lock type groove and a lingual pit. Hartsook[4] has demonstrated a considerable thickness of lingual dentin and enamel in fairly young patients and has used this lingual pit successfully for retention purposes. This pit is usually 2 mm. in depth and parallel to the groove. The crown is waxed on the tooth using any one of several accepted direct waxing technics. The entire thickness of wax in the lost portion of the

4. Hartsook, J. T. Treatment considerations for the loss of children's permanent incisor teeth. J.A.D.A. 40:414 (April) 1950.

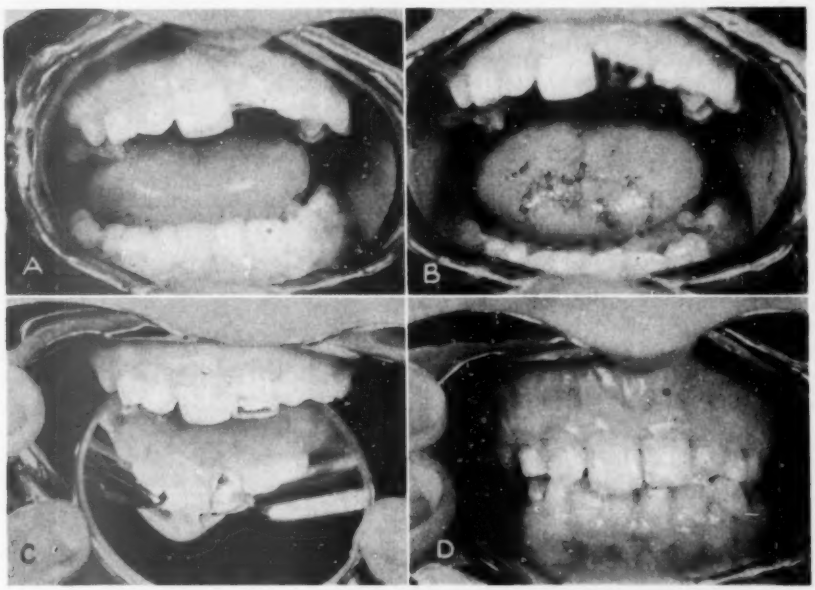


Fig. 3 • A: Technic of restoring severe loss of tooth structure in a Class III fracture with a three-quarter crown and resin veneer. B: Direct wax technic with all the labial wax in position. The wax is then carved away leaving a narrow incisal band. C: Cast crown in position illustrating the incisal gold band. This is to retain the resinous filling material and to limit the spread of the resin. D: Completed crown. This will serve until such time as the patient and tooth are mature enough to have a porcelain jacket crown constructed

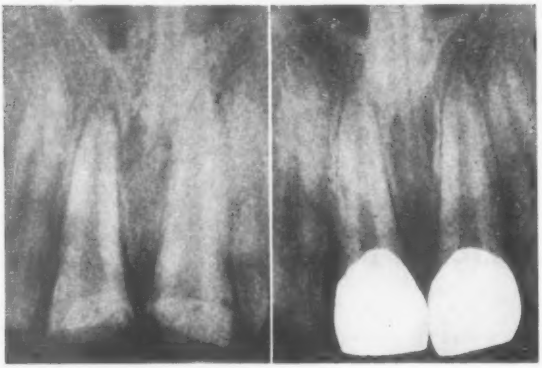


Fig. 4 • Left: Class III fracture treated with pulp capping. Patient reported to the office within several hours after the accident. Pulp horns were exposed and showed extreme vitality to touch. Pulp capping was indicated and was performed with calcium hydroxide and cement. Right: Three-quarter crowns were constructed two months later. Time interval between films is two and a half years

tooth is removed from the labial to the lingual surfaces, leaving a thin strip of wax on the incisal edge. This edge of wax, reproduced in gold, has a dual purpose—it aids in the retention of the resin filling material and it also prevents this material from coming under direct biting stresses. Figure 3 illustrates the various steps in the waxing technic and the completion of this crown. These crowns are extremely durable and have a definite role in the maintenance of the remaining tooth structure. They have the further advantage of meeting severe esthetic requirements. At some future time, when physiologic requirements are met, a porcelain jacket crown restoration can be inserted.

CLASS III

The treatment of fractured teeth where the pulp tissue is actually exposed, gives the operator some choice of treatment. It, however, will be predicated on several important diagnostic signs; these are, the extent of the exposed pulp tissue; the time elapsed since the accident and the size of the root canal opening at the apex of the tooth. Depending on these factors and on a thorough case history, this tooth can be capped or undergo a vital pulpotomy.

Should the situation meet the following criteria, pulp capping with calcium hydroxide may be employed: (1) The exposure is minute and the elapsed time less than one day; (2) the apical foramen is fully formed or nearly so; (3) there is a good vitality reaction.

Figure 4 shows instances of pulp capping. These are of one and one-half years' duration.

The results obtained from the vital pulpotomy (Fig. 5) have been so gratifying that this is the method of choice for almost all teeth where the pulp is involved. The reactions of vital pulp tissue to calcium hydroxide has been the object of many studies and many reports have appeared in current literature attesting to its suitability. Zander and Glass[5] showed microscopically the repair of pulp tissue by a histologic process, the formation of a new or a repaired odontoblastic layer and the deposition of new dentin over the site of injury. The success of either method, pulp capping or pulpotomy, depends on the use of a sterile technic and the prevention of the transmission of pressure to the pulp during any part of the operation. Once the pulp has responded favorably to either treat-

5. Zander, H. A., and Glass, R. L. Pulp healing. J. D. Res. 28:97 (April) 1949.

ment, these teeth are restored with cast gold three-quarter crowns with the resin window.

CLASS IV

The teeth in this category are nonvital, with or without any loss of tooth tissue (Fig. 6). Many children receive only slight blows and lose none of the clinical crown but the teeth become nonvital within a few weeks. The practitioner needs only to use the Vitalometer and take a roentgenogram to confirm the diagnosis of loss of vitality.

One conservative and successful approach[6] to the treatment of these teeth has been the apicoectomy. There are many capable endodontists who have demonstrated, in uncounted thousands, the efficacy of the pulpectomy but the apicoectomy offers several advantages when used in the young patient.

1. The root canal filling at the apex is clearly visible at all times to the operator and its density and position are in his control.

2. The removal of all pulp tissue is a certainty and there is very little likelihood of overlooking tissue in lateral canals. A great percentage of failure in the pulpectomy is caused by the lack of removal of all the tissue in either the main or accessory canals.

3. With the technic of performing the

6. Blum, T. Life span of teeth whose roots have been resected. New York J. Den. 15:60 (Feb.) 1945.

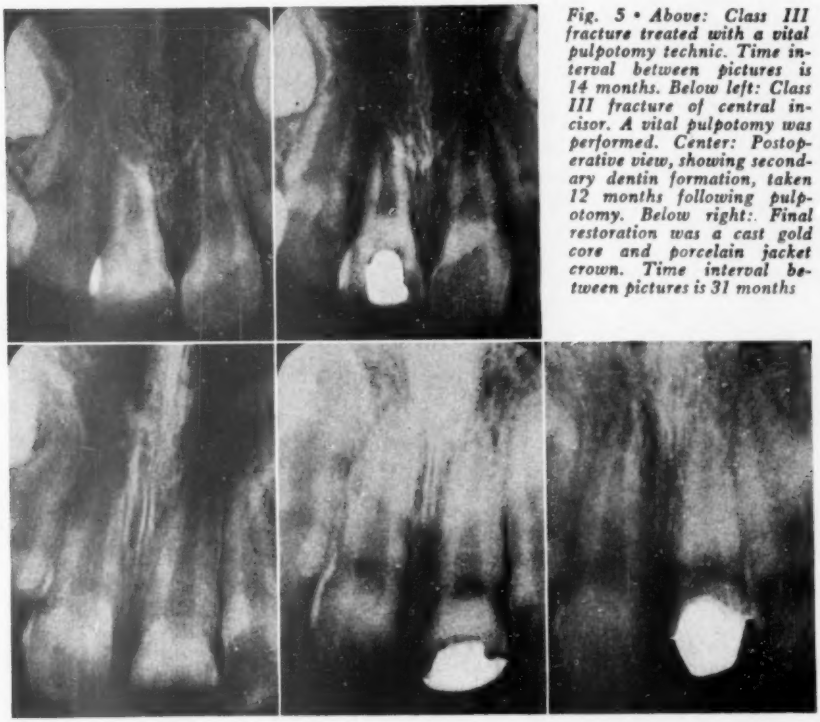


Fig. 5 • Above: Class III fracture treated with a vital pulpotomy technic. Time interval between pictures is 14 months. Below left: Class III fracture of central incisor. A vital pulpotomy was performed. Center: Postoperative view, showing secondary dentin formation, taken 12 months following pulpotomy. Below right: Final restoration was a cast gold core and porcelain jacket crown. Time interval between pictures is 31 months

Fig. 6 • Class IV fracture of upper left central incisor; a simple accident with no pain experienced until six weeks afterward. Tooth discolored and gave a nonvital reaction to the pulp test. This case treated with an apicoectomy

root amputation first and then the root canal, through and through drainage is present and all medication[7] is introduced at the crown opening and removed from the apical area. This permits the filling of a dry root canal.

SUMMARY

An accurate clinical and roentgenographic survey must be made of all fractured anterior teeth in order to fully appraise the extent of the injury. The treatment, based on information obtained from this survey, is essentially protective in nature where the pulp tissue is not exposed and endodontic in character where it is. The esthetic reproduction of lost tooth tissue is important and should be given careful study in relation to the dental age of the patient.

CONCLUSIONS

1. The treatment of traumatized anterior teeth is within the province and responsibility of every dental practitioner.
2. A logical treatment plan should be instituted at the earliest possible time.
3. Once these teeth have been treated, they must be protected from further injury.
4. The chances of success are greatly increased with early diagnosis and proper evaluation for definitive care.

24 Washington Street

7. Wakefield, B. G. Root canal therapy and resection technique. Oral Surg., Oral Med. & Oral Path. 3:743 (June) 1950.

Aging Population • Within the brief period of one decade—from 1940 to 1950—the population at ages 65 and over in the United States increased by 37 per cent, whereas the number at ages under 65 rose by only 13 per cent. There are now more than 12,300,000 people past their 65th birthday in the country, or 1 out of every 12 in the entire population. At the beginning of the century the ratio was 1 out of every 25.

Anhidrotic ectodermal dysplasia with anodontia: a study of two families

Frank G. Everett, D.M.D., M.D.; Ellis B. Jump, D.M.D., Ph.D.; Wallace F. Sutherland, D.M.D.; Bhim Sen Savara, B.D.S., L.D.S., M.S., and Theodore Suher, D.M.D., Portland Ore.

Anhidrotic ectodermal dysplasia is a rare hereditary abnormality of which the outstanding characteristics are anhidrosis or hypohidrosis, anodontia or oligodontia and hypotrichosis. Patients afflicted with this malformation show a typical facies resembling that of congenital syphilis; a saddle nose, bulging frontal prominences and pointed ears. Their skin is soft, thin and dry, the hair sparse and thin. Atypical cases have been described[1] with one or the other symptom of the syndrome present to a lesser extent or absent. Observation of the oral mucosa has received scant attention in the literature.

These patients are sometimes seen as infants with minor ailments or with severe hyperthermia, caused by hot weather. This difficulty can be explained by their inability to perspire sufficiently. Treatment is largely symptomatic.

During later years some dental abnormality (delayed dentition, oligodontia or anodontia) becomes apparent in these children and causes the parents to bring them to the dentist. Prosthetic appliances are usually indicated[2,3] and they must be adjusted frequently or be remade as the child matures.

REVIEW OF LITERATURE

The first description of this syndrome comes from Widderburn[4] and the name "anhidrotic ectodermal dysplasia" was given to this malformation by Weech.[5] Upshaw and Montgomery,[6] in reviewing the literature, reported on approximately 80 cases known prior to 1947. Descriptions of clinical characteristics and symptomatology differ only slightly throughout the references. Differences of opinion do arise, however, as to the mode of genetic transmission of this abnormality[6-15] which

From the University of Oregon School of Dentistry, Portland, Ore. This study received financial support from the Oregon State Board of Dental Examiners.

1. Thannhauser, S. J. Hereditary ectodermal dysplasia of the anhidrotic and hidrotic types. In The practitioners library of medicine and surgery; supplement, Blumer, George, editor. New York, D. Appleton-Century Co., 1938.

2. Teutsch, L. W., and Hartsook, J. T. Ectodermal dysplasia, anhidrotic type: report of a case. J.A.D.A. 37:636 (Dec.) 1948.

3. Loving, H. E. Anodontia in a child. J.A.D.A. 39:233 (Aug.) 1949.

4. Widderburn, W., cited by Thannhauser, S. J. Hereditary ectodermal dysplasia of the anhydrotic type with symptoms of adrenal medulla insufficiency and with abnormalities of bones of skull. J.A.M.A. 106:908 (March 14) 1936.

5. Weech, A. A. Hereditary ectodermal dysplasia (congenital ectodermal defect): a report of two cases. Am. J. Dis. Child. 37:766 (April) 1929.

6. Upshaw, B. Y., and Montgomery, H. Hereditary anhidrotic ectodermal dysplasia. Arch. Dermat. & Syph. 60:1170 (Dec.) 1949.

7. Upshaw, Bette Y. Congenital ectodermal and mesodermal dysplasias: a clinical and pathological study. Mayo Foundation Study, 1948.

8. Stadler, H., and Blackstone, C. H. Hereditary ectodermal dysplasia of the anhydrotic type. J. Pediat. 21:229 (Aug.) 1942.

9. Feisher, Z. Hereditary ectodermal dysplasia. Arch. Dermat. & Syph. 49:410 (June) 1944.

10. Thannhauser, S. J. Hereditary ectodermal dysplasia of the anhydrotic type with symptoms of adrenal medulla insufficiency and with abnormalities of bones of skull. J.A.M.A. 106:908 (March 14) 1936.

may be a dominant, recessive or sex-linked character. However, most patients displaying this abnormality are described as showing recessive, sex-linked characteristics. Males are afflicted about eight times more frequently than females.[6] It seems not to be confined to any one race,[7] but no cases have been reported in members of the Negro race to the knowledge of the authors.

There is disagreement among the investigators who describe this disease regarding its correlation with mental defects. Only a few observers[11,13] have noted conspicuous differences in mentality between children afflicted with this condition and normal children.

The principal oral defects associated with this pathosis are anodontia or oligodontia. Delayed eruption, a dry mouth and generally atrophic mucosa have also been mentioned.[6,11,14,16] The alveolar process may or may not be normal in its development.[6,16,17] If any teeth are present, the incidence of dental caries is claimed to be high.[9]

Hypohidrosis and hyperthermia, the most important clinical part of the syndrome,[6] tend to become less bothersome as the individual matures and learns to live with his infirmity; the persons afflicted with this abnormality have normal life expectancy.[6]

CASE 1

R. G., an 8½ year old boy, was born June 3, 1942. Pregnancy and birth were uneventful. The diagnosis of anhidrotic ectodermal dysplasia was made tentatively in the early months of the patient's life by the family physician when it was necessary to bathe the child in cold water as often as every 10 minutes during the hot summer weather in order to keep his body temperature within reasonable limits. When the boy was 2 years old he was treated for coryza accompanied by extremely high body temperature in the Doernbecher Memorial Hospital for Children connected with the Medical School of the University of Oregon. The case history taken at that time reads essentially as follows: "Father and mother alive and well. Patient presented no history of injuries, operations and illnesses. He had a nine-months' gestation, low forceps delivery. His birth weight had been 6 lbs. 15 oz. At the time this history had been taken (6/5/44), the two-year-old patient had talked words and combinations, had had no teeth. He had sat up at 6 months and walked at 12 months. He had received daily doses of 20 drops of a fish liver oil with viosterol and 'some' calcium phosphate. He had been taken to the hospital during his present illness for treatment of a cold and fever resulting from exposure."

The results of a physical examination taken at the time of admission into the hospital were recorded as follows:

Eyes: Pupils, reflexes, visual field, nystagmus, extra-ocular movements, fundus, sclera, vision and convergence were tested for with no abnormal findings.

Fontanelles: Normal.

Eardrums and nasal mucosa: Moderately injected.

Oral cavity: Edentulous.

Chest: Slight inspiratory stridor.

Abdomen: Negative.

Liver and other abdominal organs: Negative.

Lower extremities: Negative.

Sensory or motor disturbances: None.

Blood count (including differential) and hemoglobin: Within normal range.

11. Bruno, F. E., and Englehardt, H. T. Hereditary ectodermal dysplasia. Ann. Int. Med. 20:140 (Jan.) 1944.

12. Cohen, M. M., and Wagner, R. Ectodermal dysplasia with partial anodontia. Am. J. Dis. Child. 68:333 (Nov.) 1944.

13. Halperin, S. L., and Curtis, G. M. Anhidrotic ectodermal dysplasia associated with mental deficiency. Am. J. Ment. Deficiency 46:459 (April) 1942.

14. Thoma, K. H. Oral pathology, ed. 3. St. Louis, C. V. Mosby Co., 1950.

15. Thoma, K. H., and Allen, F. W. Anodontia in ectodermal dysplasia. Am. J. Orthodont. & Oral Surg. (Oral Surg. Sect.) 26:503 (May) 1940.

16. Grant, R., and Falls, H. F. Anodontia: report of a case associated with ectodermal dysplasia of the anhidrotic type. Am. J. Orthodont. & Oral Surg. (Oral Surg. Sect.) 30:661 (Nov.) 1944.

17. Brodie, A. G., and Sarnat, B. G. Ectodermal dysplasia (anhidrotic type) with complete anodontia. Am. J. Dis. Child. 64:1046 (Dec.) 1942.

Blood serology (Kahn): Negative.
Urine: Negative for sugar, protein or other pathological constituents.
Head hair: Very few.
Body hair: Practically none.

The diagnosis nasopharyngitis and laryngitis was made and the family physician's diagnosis of hereditary ectodermal dysplasia was confirmed. The acute condition subsided and the boy was discharged from the hospital after a stay of approximately two weeks.

Several months later (November 6, 1944) the patient was readmitted to the same hospital with the complaint that his respiratory difficulties had gradually increased again after his dismissal from the hospital five months before. At this later time the diagnosis bronchial asthma was made and the child treated successfully with ephedrine.

In February 1947 the boy, then 4 years old, was admitted to the infirmary of the Dental School of the University of Oregon for dental care.

FAMILY HISTORY

Figure 1 represents a family tree showing sibships for two generations and the line of descent for four generations. The siblings of the patient appeared normal with no demonstrable ectodermal defects. One brother, who had been killed in an accident several years before, is said to have shown no pertinent abnormalities.

Of the parents only the mother had an involvement of possible significance in the form of hypoplasia of the fingernails and toenails, a malformation constituting one form of ectodermal underdevelopment.[6,7,11,18] Her basal metabolic

18. Clouston, H. R. A hereditary ectodermal dystrophy. Canad. M.A.J. 21:18 (July) 1929.

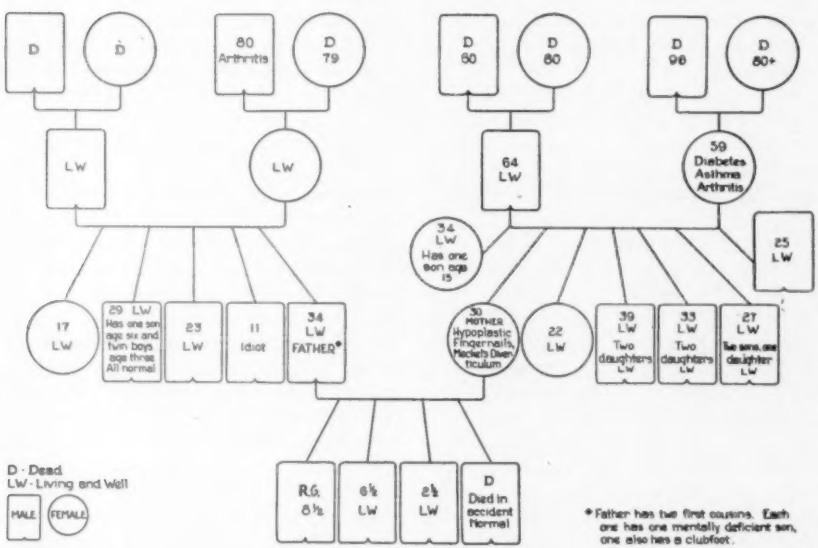


Fig. 1 • Case 1. Family tree

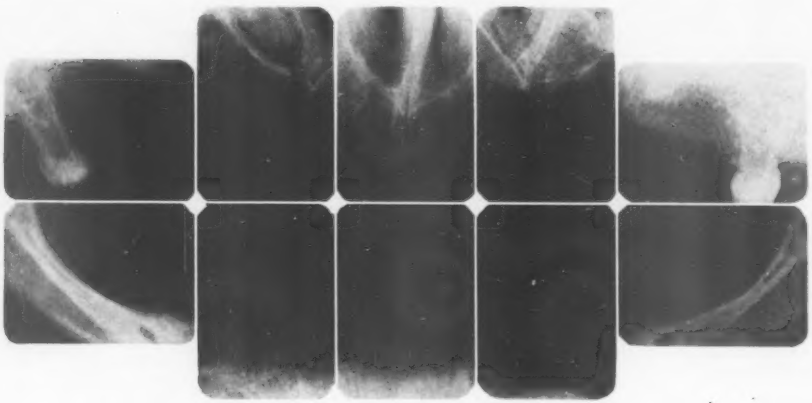


Fig. 2 • Case 1. Full mouth roentgenograms taken in February 1947 at 4 years of age

rate, when taken by her physician at that time (1947), was –5. She had been given medication for thyroid difficulties for many years partly in treatment of existing obesity. Repeated requests for subsequent re-examination of her basal metabolic rate have been denied by the patient.

One of the father's brothers and two male children of a first cousin showed mental deficiencies. This observation is interesting in view of an earlier paper by Halperin and Curtis.[13]

Patient's Appearance and Thermal Regulation • The boy had at that time (February 1947) some sparse hair on his head, but hardly any eyebrows or eyelashes. He had been able to regulate his body temperature somewhat better and had been able to pursue moderate play and other activities.

Oral Examination • The patient had the right and left upper deciduous second molars in place; these had erupted at 3 years of age and were morphologically normal but required restorations in carious lesions. Roentgenographic intraoral films (Fig. 2) showed no additional teeth or tooth buds, deciduous or permanent, present in the jaws. Cavities in the two deciduous molars were repaired with amalgam restorations and a course of four applications of sodium fluoride was administered to the two teeth. Upper and lower dentures were constructed for the boy.

PRESENT STATUS (MARCH 22, 1951)

Aside from the symptoms of ectodermal dysplasia itself, this patient has enjoyed a remarkable degree of freedom from childhood diseases and illnesses of all kinds even when intimately exposed to them in his home. His medical history is noteworthy for the classical symptoms of his infirmity; namely hyperthermia and pathosis of the respiratory mucosae[6] throughout his life; he suffers from a deficiency of teeth, hair and saliva, and has the typical facial configuration, thereby exhibiting the syndrome in its full range (Fig. 3). At the present age of 8 years and 9 months the boy has reasonable control of his body temperature but must avoid extreme heat and direct exposure

Fig. 3 • Case 1. Profile view showing patient not wearing dentures. Note scarcity of hair at the temples, bulging frontal eminences and depressed bridge of the nose

to the sun in summer. His present weight is 59.5 lbs. and his height is 52 inches. On Wetzel's grid[19] his physical status is good (channel B_3) and his developmental level is in accord with 67 per cent of the general population of children. According to Meredith's growth standards,[20] he is moderately light and moderately short for his chronologic age. He is an average student in the third year of grade school and has been able during the last summer to run and play moderately with other children without the necessity of being cooled repeatedly. A fairly effective cooling mechanism apparently exists that acts by transudation through the skin and the activity of some few sweat glands, although visible perspiration is not present at any time.

Perspiration and thermal regulation were tested objectively by placing the patient up to his neck in a chamber in which moist heat was maintained at a temperature of about 100° F. In 22 minutes the body temperature, measured orally, increased 3.5° F. In a normal person the increase in body temperature under identical circumstances was 0.7° F. During the time the patient spent in the heat chamber, the skin on his forehead was tested for the number of sweat gland openings by Minor's method.[21] In this test the skin of the patient is painted with Minor's iodine solution, dried and then powdered lightly with starch. As the patient perspires, the openings of the sweat glands appear as dark points. Normal average number of sweat pores in this area is about 110 per square cm.[22] After 20 minutes in the heat chamber, the boy showed only about 120 openings in a field of 40 square cm. (Fig. 4); that is, about 3 pores per square cm., and must

19. Wetzel, N. C. Physical fitness in terms of physique, development and basal metabolism, with guide to individual progress from infancy to maturity: new method for evaluation. J.A.M.A. 116:1187 (March 22) 1941.

20. Meredith, H. V. A "physical growth record" for use in elementary and high schools. Am. J. Public Health 39:878 (July) 1949.

21. Minor, V. Ein neues Verfahren zu der klinischen Untersuchung der Schweissabsonderung. Deutsche Ztschr. f. Nervenh. 101:320 (Dec.) 1927.

22. Krause, cited by Kuno, Y. The physiology of human perspiration. London, England, J. & A. Churchill, 1934.

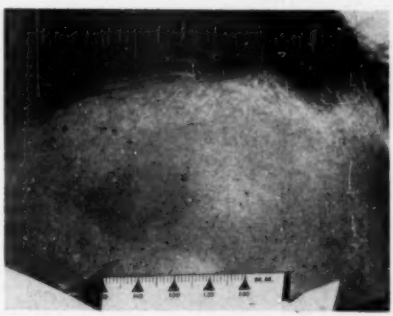


Fig. 4 • Case 1. Minor's test for number of sweat pores on the forehead while patient was in the heat chamber. Picture taken after the patient had spent 20 minutes in the heat chamber. Number of black dots indicate number of sweat pores

Fig. 5 • Case 1. Note underdevelopment in the lateral aspects of the upper alveolar ridge

therefore be considered as almost completely anhidrotic.

The hair on the boy's head is somewhat more plentiful now but is still thin and sparse. He has no body hair. Eyebrows and eyelashes are thin and scarce (Fig. 3). His skin is smooth as glass and the nails are thin but smooth. Examination of chest, heart, abdomen and genitalia revealed no pathologic condition. He has continued to have intermittent attacks of bronchial asthma since the age of 2. Association of asthma and ectodermal dysplasia has been mentioned repeatedly in literature.[6,7,11]

The pupils are round, of equal size, and react to light promptly. The lenses are clear, fundi both negative. Lacrimal secretion, sometimes diminished in ectodermal dysplasia[6] was tested by Schirmer's[23] method: "A piece of filter paper, measuring 5 mm. in width, is bent so that a few millimeters can be inserted into the conjunctival sac over the lower lid, the remainder hanging down on the outside. In a normal individual, after five minutes, 15 mm. of the remainder of the filter paper will be wet with tears." Lacrimal secretion tested by this method was found normal in quantity in this patient.

A thyroid deficiency was assumed to exist in December 1946 by evaluation of bone age in carpal roentgenograms and the boy at that time was placed on a daily dose of 0.7 grains of desiccated thyroid substance. A recent evaluation of bone age in a carpal roentgenogram shows that the boy is 18 months retarded as compared to normal standards established by Greulich and Pyle.[24] A basal metabolism test given in March 1951 yielded a rate of –14. Blood cholesterol was 127 mg., which is in the lower normal range. Taken together these two laboratory observations in a patient undergoing therapy for thyroid difficulties indicate a sizable thyroid deficiency. It should be pointed out here that endocrine dyscrasias occurring in this disease probably are not to be considered etiologic factors, even though their incidence is higher in persons afflicted with ectodermal dysplasia.[10,11]

Routine red and white differential counts, the Kahn serologic test and urinalysis gave negative results.

ORAL EXAMINATION

The patient had only two upper deciduous molars. These two teeth had to be

23. Schirmer, cited by Adler, Francis H. Giffords textbook of ophthalmology, ed. 4. Philadelphia, W. B. Saunders Co., 1947.

24. Greulich, W. W., and Pyle, S. I. Radiographic atlas of skeletal development of the hand and wrist. Stanford, Calif., Stanford University Press, 1950.

filled repeatedly during the four years of observation at the dental school notwithstanding the application of sodium fluoride. The reason probably lies in the patient's inability to produce an adequate amount of saliva.[25,26] Examination of saliva samples taken within a period of two weeks showed lactobacillus counts of 5,000, 75,000, 90,000 and 117,000 lactobacilli per milliliter of saliva; in general, caries activity is indicated by counts over 10,000, or by counts of increasing numbers.[27] The examination also yielded a salivary pH of slightly over 7, a normal number of epithelial cells and bacilli, a few cocci, and no Vincent's organisms. The boy wears upper and lower dentures which have had to be made and remade repeatedly during the last four years to allow for more normal mastication and facial expression.

Cephalometric profile and anteroposterior roentgenograms have been analyzed and, in accord with previous reports,[17] all of the angular measurements fall within a normal range. The facial pattern was considered a good one.

The oral mucosa looked normal on clinical examination except for a rather dry appearance; the patient required more than five minutes to produce the 2 cc. of saliva needed for examination. The alveolar process seemed well developed in the lower jaw, somewhat less well developed in the upper jaw (Fig. 5).

HISTOPATHOLOGY

A specimen was obtained for biopsy from the skin of the palm and the vestibular mucosa of the lower lip. These were obtained under general anesthesia.

Skin of the Palm • The epithelial layer was thin and showed excellent intercellular bridges (Fig. 6 and 7). Few mitoses were visible; the individual epithelial

25. Cheyne, V. D. Effect of selective salivary gland extirpation upon experimental dental caries in the rat. Proc. Soc. Exper. Biol. & Med. 42:587 (Nov.) 1939.

26. Gurley, W. B. Unilateral dental caries. J.A.D.A. 26:163 (Jan.) 1939.

27. Jay, P. The reduction of oral lactobacillus acidophilus counts by the periodic restriction of carbohydrate. Am. J. Orthodont. & Oral Surg. (Oral Surg. Sect.) 33:162 (March) 1947.

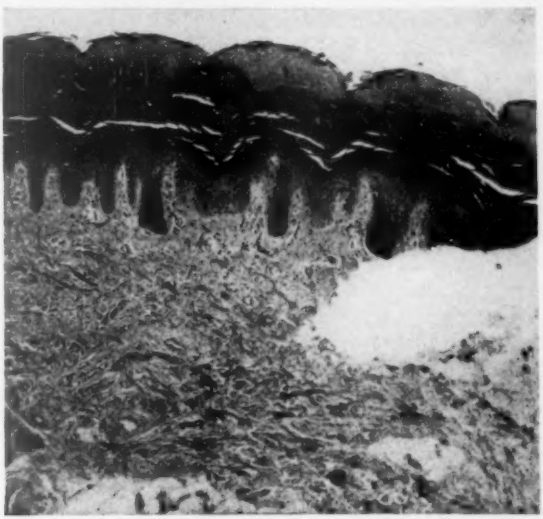


Fig. 6 • Case 1. Section of skin from the palm of hand. Note absence of sweat glands. Hematoxylin and eosin. Magnification X48

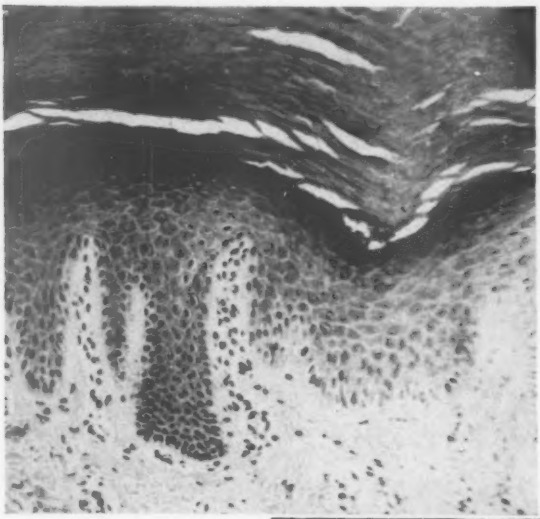


Fig. 7 • Case 1. Higher power view of section shown in Figure 6. Note thinness of epithelial layer and absence of sweat glands and their ducts. Magnification X142

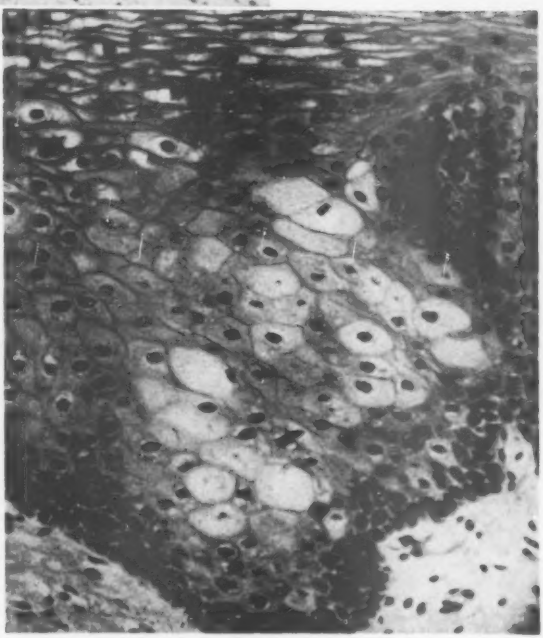


Fig. 8 • Case 1. High power view of section of mucous membrane from the vestibular surface of the lower lip. Note enlargement of cells in prickle cell layer, almost complete absence of intercellular bridges and presence of perinuclear spaces. Hematoxylin and eosin. Magnification X295

cells, however, appeared normal. The significant and typical feature in this section was the complete absence of sweat glands.

Vestibular Mucosa of the Lower Lip: The number of mitoses in the germinative layer of the epithelium was decreased (Fig. 8) which may indicate a retardation in the replacement cycle. The cell membranes were very apparent and hardly any intercellular bridges were visible. The individual cells, particularly the ones within the prickle cell layer were significantly enlarged, their nuclei small and almost pyknotic. Around the nuclei appeared circular and semicircular spaces which, together with the enlargement of the cells, may signify hydropic degeneration. Circumnuclear spaces were seen in adjoining germinative and granular layers. The lamina propria did not show abnormality. In the submucosa the absence of any salivary (labial) gland tissue may be noteworthy.

CASE 2

V. G., a negro girl, was born on May 24, 1947. Pregnancy and birth were uneventful. When the child was 2 years and 4 months old, she was taken to the Children's Hospital connected with the Medical School of the University of Oregon for the treatment of a coryza, a persistent cough and eczema, accompanied by increase in temperature. The child had been suffering from these conditions intermittently since birth.

A case history taken in May 1949 reads as follows: "Father and mother alive and well. No history of serious illness, operations or injuries; no familial diseases. Dietary intake reported adequate. The child is claimed to have started walking at 13 months; at this time (May 1949), she could pronounce only very few words, and speech was stammering and barely intelligible."

The results of a physical examination in May 1949 were:

Head and neck: Fontanelles closed.
Ears: Negative.
Oral cavity: Two deciduous teeth present, namely the left upper first molar and a right lower incisor; the latter one is a peg tooth.
Tonsils: Negative.
Nose and throat: Moderately injected.
Chest: Slight inspiratory stridor.
Heart and lungs: Within normal limits.
Abdomen: Negative.
Genito-urinary system: Negative.
Sensory and motor disturbances: None.
Skin: Mild scaly rash on the face.
Hair: Very sparse and thin.

The blood count (including differential) and hemoglobin were normal. The urine was negative. The reaction to the Kahn serologic test was negative. Anteroposterior roentgenograms of the wrist showed three carpal centers of ossification which is considered normal for a child between the ages of 2 and 3. Allergy tests were without results. Extraoral oblique roentgenograms showed roentgenographic evidence of 12 deciduous and permanent teeth in the mandible and maxilla.

The diagnosis of ectodermal dysplasia was made on the basis of the existing coryza,[6] eczema[6,28] and especially the paucity of hair and disturbance in the dentition. A coal tar ointment was prescribed as a symptomatic treatment of the eczema and ephedrine nose drops for the coryza.

In January 1951, the patient, now 3 years and 8 months old, was brought to the University of Oregon School of Dentistry for dental rehabilitation because of the noneruption of a large number of teeth.

FAMILY HISTORY

Only the immediate family, consisting of father, mother and brother, could be examined by us (Fig. 9). Both parents had negative reactions to the Kahn sero-

28. Lord, L. W., and Wolfe, W. D. Hereditary ectodermal dysplasia of anhidrotic type (congenital ectodermal defect). Arch. Dermat. & Syph. 38:893 (Dec.) 1938.

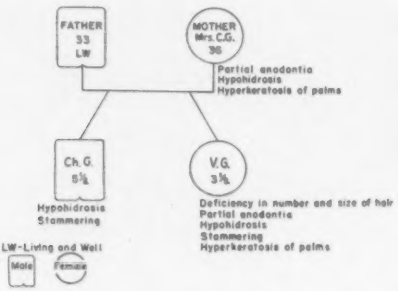


Fig. 9 • Case 2. Family tree

logic test. The father showed none of the symptoms of ectodermal dysplasia.

The mother, Mrs. G., showed considerable dental derangement (Fig. 10). Her two lower central incisors were peg teeth, the two upper lateral incisors and second bicuspids were congenitally missing, the four first molars were underdeveloped in size and showed enamel hypoplasia. Fingernails, face and hair appeared normal, as was speech and intellect. Her basal metabolic rate was −8. Thermal regulation was examined by placing the patient in the heat chamber which was kept at 100° F. The test resulted in an increase in body temperature of 1.6° F. in 22 minutes, as compared to an increase of 0.7° F. in the same period in a normal individual of the white race. Distribution of sweat gland openings examined by Minor's method was abnormal. Some areas of the skin showed a perceptibly lower number of sweat pores after 20 minutes in the heat chamber; only 40 pores per square cm. could be counted in the center of the forehead instead of the normal average of about 110 for this area in persons of the white race. Visible perspiration was present in some other areas. In view of the dental findings, the results of temperature-regulation and of perspiration tests and, possibly, of the lowered metabolic rate, we feel that Mrs. G. represents a slight case of anhidrotic ectodermal dysplasia.

The patient's older brother, C. G., 5½ years old, had normal dentition, hair and facial configuration. The basal metabolic rate was zero. The test for thermal regulation showed a faster rate of increase of body temperature, namely 1.6° F. in 22 minutes. Here also, as in the mother, distribution of sweat glands was abnormal, and their number, as visualized on the forehead after 20 minutes in the heat chamber, was about 45 per square cm., or about 40 per cent of the average for white adults. The comparison is carried out with the white adult population because figures for children, white or negroid, are not available. The boy stammers and perhaps is mentally somewhat retarded. The result of the thermal regulation test, the unusual distribution and decreased number of sweat glands, the

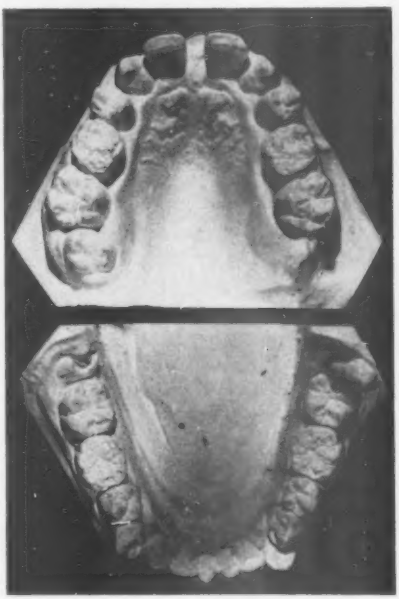


Fig. 10 • Mrs. C. G.'s casts showing absence of upper lateral incisors, upper second bicuspids, peg-shaped lower central incisors and hypoplasia of the first molars

Fig. 11 • Profile view of V. G. Observe the concave face, typical for persons with anhidrotic ectodermal dysplasia. Note also the congenitally blunted tip of the nose

impediment of speech and mental retardation indicate that this boy is an atypical example of anhidrotic ectodermal dysplasia despite the absence of other major parts of the syndrome.

PRESENT STATUS

V. G. herself is a 3½ year old negro girl of rather slight build (38.5 inches, and 31.5 lbs.). She has sparse hair on her head and scanty eyelashes and eyebrows. The profile appears concave (Fig. 11), which is typical for persons with anhidrotic ectodermal dysplasia.[6,7] The examination of eyes, ears, nose and throat showed no significant pathologic condition present except perhaps some atrophy of the nasal mucosa. Tonsils and adenoids were moderately enlarged. Ears and eardrums were normal. Schirmer's test for lacrimal secretion produced normal results, as did routine laboratory examination of the blood and urine. The reaction to the Kahn serologic test was negative. The tip of the nose had a peculiarly rounded appearance. This aberration has been described as occurring in the hidrotic form of ectodermal dysplasia.[6] The girl stammered and her intellect appeared subnormal. Basal metabolic rate was −1.

Objective examination of temperature regulation showed an increase of 2.5° F. after 17 minutes in the heat chamber as compared with an increase of 0.7° F. after 22 minutes in a healthy white adult. The comparison of rise of temperature of the patient to that of her brother and mother also indicated a disturbance of the heat regulative mechanism in the patient. Abnormality was also evident in the distribution of sweat glands; a large field in the center of the forehead showed only about 5 points per square cm., while heavy perspiration occurred in some other skin areas (Fig. 12).

ORAL FINDINGS

Intraoral roentgenograms (Fig. 13) taken January 15, 1951, showed the following erupted and unerupted teeth present: in the maxilla, two first permanent molars, two second deciduous molars, two permanent cuspids, two deciduous cuspids and a second bicuspid; in the mandible, two second permanent molars, two first per-

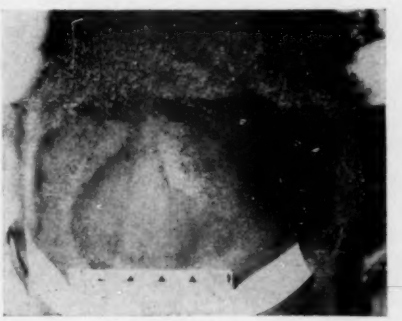


Fig. 12 • Only about five sweat pore openings per square cm. could be demonstrated by Minor's method in the central parts of the forehead of V. G. although heavy perspiration occurred in the lateral aspects

manent molars, two second deciduous molars, two permanent cuspids, two deciduous cuspids and a deciduous lateral incisor. All incisors and cuspids were of the peg variety. The teeth were free from dental caries; four lactobacillus counts taken over a period of six weeks gave negative results. Bacteriological study of the saliva showed a pH of approximately 8.4. In the smear were found some gram-negative diplococci and some gram-positive cocci, most of the latter staphylococci and only a few streptococci. Study of cephalometric head plates showed a considerable lack of alveolar growth. There appeared to exist an overclosure of the bite when in full occlusion, which resulted in a concave face and gave the appearance of lack of maxillary growth. On examining the roentgenogram taken with the mandible in rest position, this was not as noticeable and could be considered as within normal range, as analyzed by the department of orthodontics.

The oral mucosa looked normal and moist on clinical examination. In the upper incisor region, and in the region of the lower right central incisor up to and including the lower left central incisor, where there were neither teeth nor tooth germs present, the alveolar process seemed slightly underdeveloped (Fig. 14).

HISTOPATHOLOGY

Specimens were obtained under general anesthesia from the skin of the palm and the scalp, from the gingiva of the lower jaw and from the vestibular mucosa of the lower lip.

Skin of the Palm • The stratum corneum of the epidermis in most areas of the specimen was approximately double the thickness of the remaining layers. Mitotic figures in the stratum germinativum appeared slightly reduced in number, nowhere exceeding 2 per high-power field. The sudorific glands were reduced in number to about 30 per cent of the normal;[29] in a section 4 mm. long only

29. Ham, Arthur W. Histology. Philadelphia, J. B. Lippincott Co., 1950.

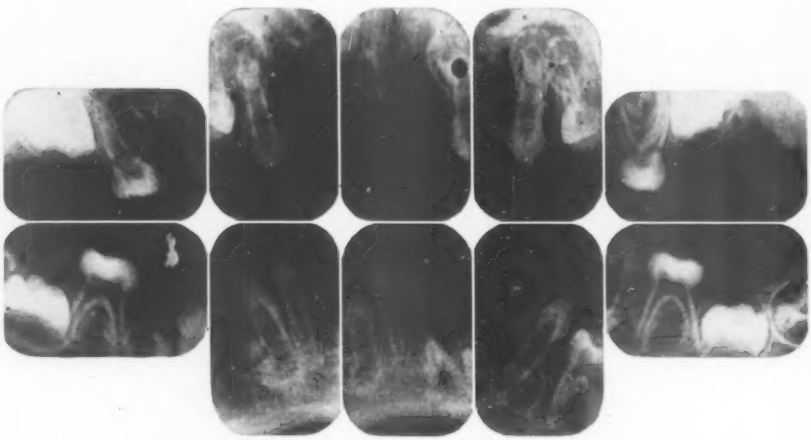


Fig. 13 • Intraoral roentgenograms of V. G. taken in January 1951

seven glands, or parts of glands, could be observed.

Skin of the Scalp • The epidermis appeared normal. In the corium the sebaceous glands appeared diminished in number and degree of development. The sudorific glands were normal in appearance and number. The important feature in this section was the reduction in the number and size of hair follicles.

Gingiva • Sections of labial marginal gingiva from the mandibular incisor region presented a normal appearance. A slight degree of parakeratosis was present.

Vestibular Mucosa of the Lower Lip • The outer part of the Malpighian layer of the epithelium exhibited vacuolization of the cytoplasm and absence of intercellular bridges. Many cells contained particularly large vacuoles adjacent to the nuclei. The germinative layer contained a normal number of mitotic figures. No glandular tissue was apparent in the submucosa.

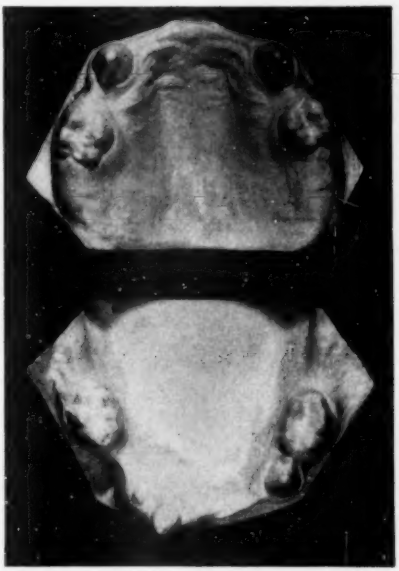


Fig. 14 • V. G.'s casts. Note slight underdevelopment of alveolar ridges. All front teeth are of the peg variety

DIFFERENTIAL DIAGNOSIS OF CASE 2

The differential diagnosis between the anhidrotic and the hidrotic form of ectodermal dysplasia was difficult in this case. The occurrence in the female sex, the dominant mode of transmission, the stammering, the rounded tip of the nose, and the hyperkeratosis of the palms pointed slightly toward the hidrotic variety.[6] Oligodontia, eczema,[28] the absence of deformities of the nails,[18] and the hypohidrosis, even though slight, all taken together, speak strongly for anhidrotic ectodermal dysplasia. The latter diagnosis is favored by these writers in further view of the fact that most opposing factors are not strictly pathognomonic for the hidrotic variety but occur occasionally in the anhidrotic variety as well.[7] It must be remembered that as many as 200 forms of ectodermal dysplasia may be distinguished,[30] and that the borderlines between these varieties are somewhat blurred. It is our opinion that the case of this family is to be classified as belonging somewhere in the scale between hidrotic and anhidrotic dysplasia, but probably closer to the anhidrotic variety.

SUMMARY

1. The typical syndrome of anhidrotic ectodermal dysplasia is described and literature dealing with this malformation is reviewed.

2. The first case history follows one patient, afflicted typically with this condition, from birth to age 8½. Typical facies and deficiency of hair, sweat glands and teeth are mentioned. Clinical examina-

30. Cockayne, E. A. Inherited abnormalities of the skin and its appendages. London, England, Oxford University Press, 1933.

tion of the oral mucosa revealed a rather dry appearance. Salivary lactobacillus counts yielded fairly high numbers, an observation well in accord with the high caries attack rate in this case and which possibly was caused by the prevailing paucity of saliva.

3. The second case described is that of a 3 year old negro girl with oligodontia, peg tooth formation and a paucity of hair. Examination of the mother revealed oligodontia and hypoplasia of a number of teeth and peg tooth formation of the lower central incisors. These two members of the family present a mild degree of a peculiar "spotty" hypohidrosis; as with all the other symptoms, this one is most pronounced in the little girl. So far as we know, this is the first case report of anhidrotic ectodermal dysplasia in a negro family.

4. All persons described suffer from major disturbances in their mechanism of thermal regulation, as evidenced by an accelerated rate of increase in body temperature when placed in a heat chamber maintained at a constant temperature of 100° F. This disturbance is due to a decreased number of sudorific glands as visualized by Minor's method, and is further proved by skin biopsies.

5. Case 1 and Case 2 (V. G.) showed a pronounced hypotrichosis.

6. Case 1 and two members of the family of Case 2 (V. G. and Mrs. C. G.) showed abnormalities of dentition; that is, oligodontia and hypoplasia of some teeth.

7. Histologic study of sections taken from the mucosa of the vestibular surface of the lower lip in Case 1 and in one member of the family (V. G.) in Case 2 is reported.

8. The mode of inheritance in both families seems to have been dominant. Members of both families remain under observation. At some later time we shall report on the growth and development of these children particularly with respect to cephalometric appraisal.

Philosophy and the Specialized Studies • It is commonly recognized that the most significant difference between philosophy, on the one hand, and the more specialized studies, such as science, art, religion, education, and politics, on the other, is that philosophy is concerned with the critical examination of certain concepts and beliefs that are presupposed by these more specialized studies. For example, the average scientist readily admits that, although his study is based upon certain beliefs in the uniformity of nature, the rationality of the world, and the relative attainability of truth, he is not himself, as a scientist, called upon to subject these notions to critical examination. He can argue either that such justification is not ordinarily required for the actual carrying on of science, or that if such justification is demanded it can readily be provided by the philosopher whose job is, by common consent, precisely the examination of the assumed notions of science. Similar considerations apply to art, religion, education, politics, and the other specialized studies. Thus there have arisen, particularly in recent years, philosophical disciplines, such as the philosophy of science, the philosophy of art, and the philosophy of education, whose assigned tasks have been the disclosure and critical examination of the unconscious beliefs and assumptions held by the scientists, the artists, and the educators. *A. Cornelius Benjamin, "Science and its Presuppositions," The Scientific Monthly 73:150, September, 1951.*

The mechanics of dental structures

Edwin S. Smyd, D.D.S., Detroit

Prosthetic dentistry is practiced largely as an empiric art. Science seeks to rationalize and generalize facts in order to gain predictability. Objectivity and reliability are thus served and the hazards of "cut and try" measures are reduced to a minimum. Dentists employ much technology. The laws and principles of the more exact allied sciences should be utilized in order to soundly base as many technical procedures as possible.

DEFLECTION AND TORSION

The characteristics of deflection and torsion have been described and some mathematical analysis has been applied in previous writings.[1,2,3] In judging these factors in inlay and bridge mechanics, the bridge has been considered as being of homogeneous material and uniform section. Dental bridges, while approximating this condition in some constructions, are usually composites of gold alloy and porcelain or plastics. What has been written still applies in principle to ordinary bridge construction although the analytical problem becomes more complex. It must be obvious after even a cursory view that where porcelain, with a modulus of elasticity in the range of 16,000,000 to 45,000,000 lbs. per square inch,[4] is used for cosmetic purposes in bridge construction, the resulting pontic will be much stiffer than when plastic (methyl methacrylate), with a modulus of elasticity of 400,000 lbs. per square inch,[5] is used.

What is this modulus of elasticity, or Young's modulus, as it is sometimes called, and why is it important?

Modulus of elasticity is a ratio of stress: strain. The ratio only applies within the elastic limit of a given specimen. Simply stated for the English system of units, the numerator of the fraction is the number of pounds per square inch which it takes to produce a given increase or decrease (depending on whether the test is done in tension or compression) in the length of one inch of specimen. The denominator is the amount of increase or decrease. If the force required to produce the deformation is great as in the case of steel, the numerator will be a large figure while the denominator will be a relatively small one. When the arithmetic of dividing the large number by a small one is carried out, the quotient is a large figure, 30,000,000 lbs. per square inch for steel. When the numerator is a relatively small figure with respect to the denominator, as in the case of rubber, the resulting quotient is a low number. To the uninitiated it may seem strange to say that

1. Smyd, E. S. Advanced thought in indirect inlay and fixed bridge fabrication. Part I. J.A.D.A. 31:759 (June) Part II: Dental engineering 31:913 (July); Part III: Indirect inlay impression technic 31:1052 (Aug.) 1944.
2. Smyd, E. S. Dental engineering. J. D. Res. 27:649 (Dec.) 1948.
3. Smyd, E. S. Dental engineering as applied to inlay and bridge fabrication. New York J. Den. 21:161 (April) 1951.
4. Decker, A. R. Research investigation for Champion Spark Plug Co., private communication.
5. Skinner, E. W. Science of dental materials. Philadelphia, W. B. Saunders Co., 1940, p. 87.

steel and partial denture gold have a high modulus of elasticity whereas rubber has a low one.

The modulus of elasticity is important because it is a measure of stiffness just as feet and pounds are measures of length and weight respectively. It is possible to tell at a glance by the modulus of elasticity of a given specimen how it will behave as a veneering material in dental bridge construction.

In addition to being a very stiff material, porcelain is brittle, so, like concrete and dental cement, it will do poorly in tensile stress. It finds its optimal application in bridgework when used on the occlusal surface with the structural framework on the tensile or tissue side. This is analogous to concrete-slab construction; the load-bearing part of the slab is on the compressive side of the neutral axis, whereas the re-enforcing rods are on the tensile side. For esthetic reasons this kind of construction is not acceptable for upper bridges because the "boxing" or "cradling" necessary to support the porcelain would place metal on the conspicuous buccal surfaces.

It is easy to see why porcelain fractures when used in the orthodox manner in upper bridges. Since the masticatory cycle consists of a horizontal as well as a vertical movement, the buccal cusps of upper bridges often come into heavy stress with the result that the gold alloy overlaying the porcelain is frequently stretched or peened out when the bridge is in use, often to a thin fin which can be observed extending out beyond the tip of the porcelain. This is most noticeable if the occlusal surfaces are not drafted properly in eccentric position and opposite cusps meet end to end. The stretching of the buccal cusp tends to bend or deflect the porcelain at the point of its retention. Since porcelain will take only a very limited amount of tension, fractures across the pins or post must be expected.

On the other hand, if the porcelain pontic is suspended from an occlusal framework, as in lower bridge construction with porcelain tube teeth, the deflection of the beam tends to pry the porcelain off especially if the metal structure is expanded by the chewing of heated food.

In view of the high flexibility factor which holds with respect to increasing the length and decreasing the depth of section, the reason for the failures of the early types of plastic bridges is apparent even when such bridges were used for little more than adornment. Originally plastic bridges were processed around a notched retaining bar which was attached to the abutments by soldering. The bar was frequently quite long, as when used in cuspid to cuspid bridge construction, and although turned edgewise it was nevertheless quite thin incisogingivally. Since a bar of such dimensions would very likely be quite flexible, and since the plastic overlaying the bar was relatively soft and yielding (modulus of elasticity, 400,000 lbs. per square inch), the structure deflected excessively in use, fatigue of the materials took place in a short time and the plastic cracked off or pulled away from the framework. When plastic is used as a veneering material, the metal framework should be made thick enough occlusogingivally to restrict excessive deflection.

Conclusions which stem from a study of deflection as it applies to dental bridge construction, whether the bridge be of homogeneous material and uniform section or a composite of metal and veneering substances, are that strong abutments are needed for long span bridges because of the tendency to wrench the abutment castings loose from the supporting teeth. Square-cut, shallow, but extensive abutment preparations for bridgework are necessary and this lends support to the indirect system of fabricating inlays because thin patterns for castings are best handled by indirect methods. This also means, however, that a good impression-taking and converting system must

be used because, from the formula $K \cdot f(n,c,A,\frac{1}{d})$, the strength of the bond is closely related to the tolerance between the casting and the tooth.[6]

MECHANICS AND BIOLOGY

It is well known to dentists, clinically, that there is an important correlation between biology and mechanics. A study of the significance of the mechanical differences among a fixed and a cantilever bridge and other prostheses may take this form: From the study with the cardboard models,[1,2] it is surprising to discover that even greatly tipped abutment teeth do not move toward each other, as might be expected, under heavy occlusal loading on the pontic. While it is common practice to employ cantilever construction for bridgework where the abutments tip toward each other in order to facilitate cavity preparation and placement of the prosthesis, from the experiment it would seem that tipped teeth require fixed or rigid coupling of the abutment castings because the fibers of the periodontal membrane are placed more nearly in pure tension. A schematic deflection diagram to illustrate the conditions of concentrated vertical loading on a fixed bridge is shown in Figure 1. Contraflexure occurs at X and Y. If the abutment castings hold to the shearing action on the cement, the deflection of the pontic produces a bending or bowing of the abutment teeth. Since teeth have considerable stiffness and mass, and since the shortening of the pontic caused by deflection is ordinarily of a low order, the significant force transmitted to the supporting teeth is axial. This tends to stretch the periodontal fibers and these in turn pull upon the alveolar bone to put it in tension. The situation is one approaching that of the bending of a lower molar when concentrated biting force is borne in the central fossa between the two separate roots of the tooth.

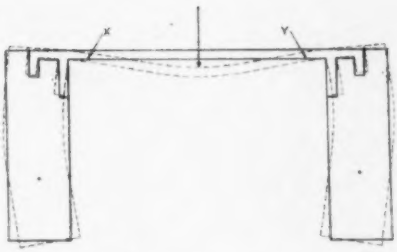


Fig. 1 • Schematic deflection diagram illustrating the effect of concentrated vertical loading on a fixed bridge. Contraflexure occurs at X and Y

Movement of teeth must occur across a mesiodistal axis of rotation as well as a buccolingual axis, and perhaps across any number of axes between these extremes. Since human teeth of either jaw exhibit arch form, for each half-jaw the vertical axis of each tooth anterior to a given tooth will be medial (with respect to the median sagittal plane of the body) to the posterior one. For this reason when any two teeth are united by a rigidly coupled prosthesis, foundational stability is promoted to resist horizontal force components.

This may be illustrated with a lower fixed bridge replacing the lower first molar. The bicuspid abutment will in normal cases be in a medial position with respect to the second molar abutment. To horizontal force with lingual direction, the root of the bicuspid has to go down while the roots of the molar come up. The rotation takes place upon an axis lying in the edentulous bone between the two teeth. This is a fair assumption on the basis of Stuteville's work on the movement of the roots of a lower molar tooth in the mesiodistal plane on mesial or distal thrust.

6. Smyd, E. S. Metal Inlays. In American textbook of operative dentistry. Gabel, Arthur B., Ed. Philadelphia, Lea & Febiger, 1947, p. 374.

The foundation stability of the cantilever type of construction is not nearly as satisfactory. Usually there is sufficient movement in the lug to permit simple hinge movement buccolingually to horizontal force components and to a less degree this is probably also true in the mesiodistal plane. The looseness of the lug at the secondary abutment permits this tooth to turn distally on its axis of rotation due to the eccentric loading on the lug. It is generally recognized that periodontal tissue is injured by excessive compressive force. If the loose coupling permits single hinge action, horizontal forces will cause excessive movement at the axis of rotation of the primary abutment. The movement will be progressively greater from the axis occlusalward and in the same order though in a reverse direction from the axis to the apex of the root. Bone resorption will be greatest where the compression of the periodontal membrane is greatest and, of course, this is the clinical picture of the damaged investing tissues associated with cantilever bridges in the mouths of patients susceptible to periodontal disease. Bridgework with rigid couplings is indicated for patients with poor periodontal metabolism.

Tipped teeth are weakened as prosthetic supports. Axial loads on the inclined roots resolve into horizontal as well as vertical force components. Adding a cantilever to the mechanical disadvantage of a tipped tooth pushes it further downhill. In cantilever construction, certainly, an occlusal or highly tapered lug should not be put into the distal abutment for, because of the natural tendency to mesial drift which all teeth exhibit, the distal abutment will tip or turn out of contact with the base of the lug, and most of the cantilever support will be borne by the smaller abutment.

Clasp type partial dentures employing shallow occlusal lugs fail to make the most of the foundational capacity of the investing tissues of any given case. Each clasped tooth is free to turn on its axis or axes of rotation to horizontal forces. Where the demands of the case are beyond the scope of restitution by fixed bridges, the precision attachment type of partial denture is the next best choice and retains most of the desirable features of fixed bridgework.

TEMPERATURE AND METALLIC FIXED PROTHESES

All tooth-borne castings, except a simple occlusal or other single-surfaced inlay and a complete jacket, contain components of an internal and external fit. The occlusal inlay is retained purely by fit within the tooth; the crown is an example of pure external fit. The dovetail and isthmus of a proximoocclusal inlay are retained by internal contact, while the flange or flared box makes external contact. Similar relations can be found for all other proximoocclusal inlay types including the three-quarter crown.

Metals conduct temperature changes more readily than mineral matter. When cold foods are eaten, an occlusal or other single-surfaced inlay will pick up and transmit the cold faster than the tooth structure and it will shrink away from the tooth structure which supports it. Heat, on the other hand, will expand the inlay and bind it more tightly in the cavity. Difficulty with retaining Class I and Class V inlays is experienced clinically. Cold and not heat is responsible for these failures. Proximoocclusal inlays do not fail from either heat or cold because, since the thermal shrinkage of the inlay is uniform or proportional to cold, the isthmus shrinks in proportion to its size. This has the effect of pulling the dovetail and proximal flange toward each other and a considerable part of the tooth and cement are thus under compression during the shrinkage. Since the compression of the tooth between the dovetail and the flange is of a low order, the tooth is elastically deformed, and as soon as the

cold environment leaves, the tooth and inlay return to normal dimension.

When an inlay involves only one surface, the thermal shrinkage of the gold produces no compressive stress in the tooth structure, and when the oscillation between thermal shrinkage and expansion is repeated a number of times the interlocking cement keys are completely crumbled. It is interesting to reflect that soft gold occlusal inlays do not fail as readily as the inlays of the hard gold alloys. The reason for this is that the occluding cusps of the dentition peen or spread the gold just as a foil plugger does in placing a gold foil filling. This occurrence can be verified readily by observing the flattening of the inclined planes of inlays and the pitting of their occlusal surfaces. Inlays so spread by occlusion elastically deform the teeth retaining them so that a mechanical grip is maintained on the inlay. This is analogous to the retention of a gold foil restoration. The elastic deformation permits the tooth to follow and hold the inlay.

The gold crown, of course, since it is externally retained, does just the reverse of the occlusal inlay. When cooled the crown squeezes and compresses the tooth structure, but when heated, the circumference of the crown becomes greater and it must expand away from the tooth. It is remarkable that substrate and organisms do not enter into the space so formed to produce recurrence of caries. One would expect that capillarity would furnish the mechanism to advance the deteriorative process.

Gold expands about 0.0000083 inch per degree Fahrenheit. If the temperatures of freshly broiled steak and of ice water are alternately applied to a gold crown, as might occur in eating, a temperature range of 100° F. might occur. The expansion of the crown from the cold to the heated state would be 0.00083 inch per inch. If the crown measures a half inch in diameter, its diameter would be 0.000415 inch bigger in the heated state. Microorganisms often associated with dental caries may range in size from 0.5 to 6 microns. (*Lactobacillus acidophilus* 0.6 to 0.9 by 1.5 to 6 microns, *Streptococcus salivarius* 0.6 to 0.8 microns, *Staphylococcus aureus* 0.8 to 1 micron, *Staph. albus* 0.6 to 0.8 micron, *Escherichia coli* 0.5 by 1 to 2 microns.) A bacterium 2.5 microns in length is 0.0025 mm. or 0.0001 of an inch long. Obviously the microorganisms are smaller than the space provided by the expanded crown.

Tooth structure and dental cement conduct heat poorly. Dental cement is often employed as a base because of its thermal insulating quality. It might be expected that it would not readily follow the crown in its dimensional fluctuations to temperature changes. However, while the rate of thermal conductance varies greatly between metals and mineral substances, the coefficient of thermal expansion may be very close. Thus while the coefficient of thermal expansion of steel is 0.0000065 per degree Fahrenheit, the coefficient of thermal expansion of concrete is 0.0000079. The coefficient of thermal expansion of tooth structure across the crown according to Souder and Peters[7] is 11.4 by 10^{-6} while gold is 14.4 by 10^{-6} per degree centigrade. What probably occurs when a gold crown is suddenly heated as in chewing hot food is that an interchange of heat occurs between the crown and the tooth which acts to stabilize the dimensions of both, the tooth acting to cool the crown and restricting its expansion while the heat of the crown expands the tooth. Analogous temperature gradients, for instance, occur across the oil film between the cylinder and piston of the internal combustion engine only that, of course, the heat is on the inside instead of the outside.

When inlays and crowns support

7. Souder, W., and Peters, C. An investigation of the physical properties of dental materials. D. Cosmos 62:305 (March) 1920.

bridgework, temperature changes may be responsible for bridge failures. Since temperature variations produce changes in the dimensions of the pontic as well as the tooth-borne castings, the proportionately greater dimensional change of the pontic produces deformations which should be taken by the abutment castings in such a manner as to subject the abutment to elastic deformation. This requires good metallic coupling. Again, the simple proximoocclusal abutment may not be sufficient to furnish the necessary coupling.

COMMENT

Where stiffness is needed in dental fabrication, as much metal as possible should be placed above and below the neutral axis as structural needs would warrant. An upper partial denture which fits between two posterior teeth on one side and which has a saddle extension over a completely edentulous posterior region on the other is a good example to illustrate the point. Since it is desirable to resist as much of the torque of the "pontoon" side as possible by the molar tooth of the other side, the bar portion across the palate should be stiff. This is ideally accomplished by using a double bar. The anterior bar is usually at a lower level than the posterior bar, and often it is turned to present a slight vertical axis. The neutral axis of this structure runs through the open part between these two bars, so great stiffness is provided with a minimal amount of metal. This device has been used empirically for a long time. Analysis serves to give an intellectual basis for its use.

In fixed bridgework when the bite is close, analysis points out that the available vertical intermaxillary dimension should not be divided between the gold and porcelain or plastic unless the porcelain is used on the compressive side of the pontic. Otherwise, it is better to use the entire vertical dimension for the metal structure with a porcelain facing for esthetics.

Three-quarter crown preparations for cuspid teeth are sometimes a problem. Since the bite is often very close in lateral excursion over these teeth, and since the size and cone-shape of these teeth require a minimum of sacrifice of tooth structure, grinding must be done judiciously. In the case of the lower cuspid the envelope of gold can be thickened for stiffness by slight exaggeration of the cingulum in forming the pattern, but for upper cuspid preparations it is often desirable to dress off the lower cuspid to provide a sufficient thickness for strength. Centric occlusion should be carefully restored in the casting to prevent subsequent extrusion of the lower cuspid.

On the other hand, if advantage is to be taken of the flexibility of a material as in the making of a clasp, thin sections should be used. Dentists who employ dental compound for inlay impressions should select tightly fitting impression tubes and use the minimum of compound to secure registry of the axial portions of their preparations for such impressions are more flexible and less likely to be permanently deformed in removal from slight undercut.

RATIONALE OF CAVITY PREPARATION

The rationale of inlay cavity preparation should take into account biology, physical properties, structural demands and economy. In addition, the usual demands of sound operative dentistry have to be met. Thus, somewhat more specifically, the following considerations further modify inlay cavity preparation:

1. The cavity preparation for inlays must have "draft" to insure accuracy in the fit of the castings. While a certain amount of pitch in the cavity walls is essential, it is easy to destroy resistance form by too much taper.[2]

2. The cavity preparation should be conservative of tooth structure and all re-

lated dental tissues. It is important not only to provide a substantial inlay or abutment casting but also to leave enough tooth structure behind for a substantial foundation.

3. The preparation should incorporate surgical principles to protect the teeth against recurrence of caries and to insure immediate and future health of the pulp. This means that, for primary abutment purposes, the cavity preparation should be relatively shallow but extensive. This is particularly important if the cavity preparation must be done in young teeth but it is also important if the preparation is to be done in old teeth which are unfilled, unabraded and noncarious. Figure 2 illustrates the need for shallow preparation. When teeth become uncomfortable following large operative undertakings, the cause can be attributed either to injudicious use of rotary tools or phosphoric acid irritation from the cementing procedure.

4. The cavity preparation should permit restoring the remaining portion of the tooth to the original or a functional form, and the casting placed over the preparation should strengthen and insure the serviceability of the remaining tooth structure. An intracoronally retained abutment should not be used on a badly mutilated tooth when with less grinding a more substantial casting can be obtained extracoronally.

5. The preparation should be such as to make the inlay esthetically acceptable.

6. The cavity preparation and subsequent procedure should be accomplished easily and inexpensively.

7. The cavity preparation should conform to engineering principles so that structural demands on the physical properties of the tooth and the restorative materials shall be properly met.

Fig. 2 • Inflammation and necrosis under dentinal tubulae of deeply prepared cavity. This occurs whether cavity was filled with silicate or zinc phosphate cement. (Photograph through the courtesy of H. A. Zander)

7815 Jefferson Avenue East

Orthodontic diagnosis for the general practitioner

M. M. Gershater, D.D.S., White Plains, N. Y.

Frequently the general practitioner is the first to observe an existing or an incipient malocclusion, especially in young patients. The question arises as to whether he is equipped to make the diagnosis confidently and to advise the parent approximately when treatment should be instituted.

In regard to the qualification of the average general practitioner to make a diagnosis of malocclusion, John W. Ross[1] comments that "In most dental schools, the orthodontic department is looked upon as a necessary evil—something which must appear in the catalogues." Munblatt[2] observes: "The general practitioner has many false impressions of the specialty of orthodontics. Having had very little instruction and training during his undergraduate career, he is helpless in his decisions and evaluations and becomes gullible to misstatements, distortions and exaggerated claims from different directions."

Since it is generally agreed that the present orthodontic education is inadequate, a program should be instituted for the general practitioner so that he will be better equipped to cope with the situation. Two steps should be taken: (1) the stressing of a more comprehensive coverage of orthodontics in the dental schools, with more emphasis on etiology and diagnosis rather than on technic and (2) concentration on a program of orthodontic education through the dental periodicals.

A difference of opinion exists among qualified dentists and orthodontists as to the proper age to start orthodontic treatment. This frequently results in confusion to the patient and the parents because diametrically opposed time factors may be presented by different men, and the general practitioner—the family dentist—is called upon to help make the final decision.

Occasionally, patients of approximately 10 years of age have a fully erupted permanent dentition excluding the third molars—a growth and development comparable to that of a much older child. On the other hand, a 14 or 15 year old individual may not have the permanent second molars erupted, deciduous teeth may still be present and the growth pattern is comparable to that of a much younger child. The physiologic growth and development factor is more important in establishing the time for orthodontic treatment than the chronologic age of the patient.

Although many advances in orthodontics have been made in recent years, there still are cases of malocclusion which

1. Ross, J. W. Orthodontic education. Am. J. Orthodont. 34:259 (March) 1948.

2. Munblatt, M. A. Orthodontic education within the scheme of dental education. Am. J. Orthodont. 35:521 (July) 1949.

are doomed to failure despite the most skilled therapy. Perhaps no attempt should have been made to treat some of these cases. On the other hand, a number of them might have had a more favorable prognosis if they had been treated at an earlier age. Early or preventive therapy may eliminate the necessity for further treatment in the later stages of development. The responsibility for recognizing the early signs of a malocclusion rests with the general practitioner; if there is a reasonable doubt in his mind as to the proper diagnosis, further advice should be sought. The chronologic age of a patient is not the deciding factor as to whether orthodontic treatment can be performed.

Orthodontic treatment usually can be instituted regardless of age, within certain limitations. The teeth must be surrounded by healthy supporting tissues and the patient should be willing and cooperative. However, in the adult patient, it is no longer possible to depend on growth and development which is so important in the treatment of younger patients. In the routine practice of dentistry, many adult patients requiring the replacement of lost teeth by fixed or removable bridges would have a better esthetic and functional result if the orthodontic and prosthetic therapy were combined.

Before a diagnosis of malocclusion can be made with confidence, a thorough knowledge of normal occlusion in the different stages of development is essential. Milo Hellman[3] has published the results of exhaustive studies of occlusion in the many stages of growth and development of the human dentition. However, in order to simplify the procedure for arriving at a diagnosis of malocclusion, the following three developmental periods will be stressed:

1. The dentition up to the eruption of the first permanent molars.

2. The transition or period of mixed dentition from the eruption of the first permanent molars to the eruption of the permanent cuspids, bicuspids and permanent second molars.

3. The period from the complete eruption of the permanent dentition (including the second permanent molars) to the eruption of the third molars and thereafter.

Normal occlusion is usually referred to in the deciduous and permanent dentitions, the first and third stages of development.

Strang[4] defines normal occlusion as "Normal relationship of the so-called occlusal inclined planes of teeth that are individually and collectively located in architectural harmony with their basal bones, and with cranial anatomy, exhibit correct proximal contacting and axial positioning, and have associated with them a normal growth, development, location and correlation of all environmental tissues and parts."

THE DECIDUOUS DENTITION

The second deciduous molars and cuspids are the keys to occlusion in the deciduous dentition. The mesiolingual cusp of the maxillary second deciduous molar occludes in the central fossa of the lower second deciduous molar. All of the deciduous teeth in normal occlusion are vertical in relation to the aveolar and basal bone and do not exhibit the same axial inclinations of the teeth as in a normal occlusion in the permanent dentition. The distal surfaces of the upper and lower second deciduous molars are usually in the same vertical place. Spaces between the incisors are common.

When the first permanent molar erupts, it may have a temporary cusp to cusp relation with its antagonist. According to Black's chart of average mesiodistal crown widths of teeth, the average mandibular second deciduous molar has a

3. Hellman, Milo. Variation in occlusion. D. Cosmos 63:608 (June) 1921.

4. Strang, Robert H. Textbook of orthodontia, ed. 2. Philadelphia, Lea & Febiger, 1943.

greater mesiodistal width than the succeeding permanent second bicuspid. The difference between the mesiodistal width of the average maxillary second deciduous molar and the succeeding second bicuspid is not as great as in the corresponding mandibular teeth; therefore there is a greater mesial drift of the mandibular first permanent molar than the maxillary first permanent molar. This will result in a correct cuspal relation which exists in normal occlusion with the mandibular first permanent molar one half cusp anterior to the maxillary first permanent molar.

The following deformities are amenable to treatment in the deciduous dentition:

1. Anterior or posterior cross-bites.
2. Extreme deformities in Class II division 1 cases.
3. Mandibular prognathism or Class III cases.

Currently, it is generally agreed that treatment in this first stage of development will help prepare the foundation for a better osseous and muscular development during the ensuing periods of greatest growth. If the deciduous dentition is placed in a normal healthy environment, there will be a greater opportunity to guide the permanent teeth into a more favorable pattern.

ORTHODONTIC TREATMENT IN THE DECIDUOUS DENTITION

The decision to start orthodontic treatment during the age period of deciduous dentition requires a careful study of the patient regardless of the deformity. The advice and cooperation of the family physician is helpful in order to ascertain the organic and mental health of the young patient. In some instances it may be necessary to seek psychiatric assistance. Obvious symptoms of neurosis, which may be manifested by pernicious habits or abnormal behavior problems, are primarily the province of the physician. Underweight patients who are also a feeding problem, or who have a history of frequent susceptibility to illness, are questionable orthodontic risks and may not respond as well as healthy children. Orthodontic treatment, although generally well received by most patients, may be difficult and trying for some, particularly for the very young or those in ill health. After a careful analysis of the case has been completed, and the decision to correct the malocclusion is made, care must be exercised to safeguard the physical and mental well-being of the patient.

VARIATIONS IN DEVELOPMENT PATTERNS

There are so many variations in tooth growth and development patterns in the intermediate or mixed dentition, that a normal occlusion occasionally may resemble a malocclusion. The dentist should be familiar with the approximate eruption time of the permanent teeth and the stages of development of the dentition so that he is able to judge whether deciduous teeth have been prematurely lost or have been retained too long. Judicious extraction or mesiodistal trimming of deciduous teeth may help prevent a subsequent deformity. It should be routine practice to construct space maintainers when a deciduous tooth is extracted and the permanent tooth is not expected to erupt for a long time, especially if it is a second deciduous molar. This will prevent the first permanent molars from drifting mesially, thereby causing the erupting second bicuspid to be impacted, rotated or crowded labially or lingually out of normal arch alignment. If the second deciduous molars are lost prematurely, the stage of eruption of the second permanent molars should be carefully considered because the anterior propelling force caused by these erupting teeth will tend to close the space more rapidly.

Spaces between the permanent incisors

Table • Measurements to determine leeway

	1	2	3	4
	Distance from distal aspect of lateral incisor to mesial aspect of first molar	Mesiodistal crown widths of four lower anterior teeth	The sum of the mesiodistal widths of the unerupted cuspid and two bicuspids	Leeway
Case A	21	25.0	22.73	−1.7
Case B	20	23	21.8	1.81

Measurements taken in millimeters.

at the time of eruption and for some time thereafter are generally considered normal and should not cause undue concern, as they usually will close in time with the normal growth and development of the dentition. The incisal spaces will not close normally when there is a discrepancy between tooth material and basal bone, or when an abnormality prevents the closure. For some time it was common practice to incise the labial frenum when a diastema existed; currently, surgery is not resorted to unless an anomaly such as an epulis, a supernumerary tooth or a cyst is a causative factor. In those instances where there is a discrepancy between the tooth material and basal bone and a more esthetic appearance is sought, orthodontic treatment followed by porcelain jackets is indicated. The operator should make this correction at the proper age so that the vitality of the teeth is not endangered.

MALOCCLUSION IN THE MIXED DENTITION

The three types of malocclusion which may be treated in the deciduous dentition also may be treated in the mixed dentition. A fourth type, crowded permanent mandibular incisors, requires a more complete explanation.

Frequently, the site of collapse following orthodontic treatment is the mandibular incisal area. A slight overlap of the incisors should be of minor concern; however, when one or more teeth are in a labial or lingual position to the normal anterior arc causing complete loss of contact, the tissues are more susceptible to irritation and gingivitis, and a serious periodontal disease may follow. Early observation and correction of the crowded condition in the mandibular incisal region may avoid future complications.

After much investigation and observation of hundreds of cases, Hays N. Nance[5] recognized the significance of crowded mandibular incisors and he worked out a procedure whereby the diagnosis of a malocclusion in the mixed dentition was simplified. Furthermore, the type of deformity and the prognosis could be anticipated at its inception. Nance writes: "John Hunter, in 1771, after extensive investigations with a method which revealed precisely the sites of new bone growth, made the following statements which are quoted by Brash: 'The jaw still increases in all points till 12 months after birth, when the bodies of all the six teeth are pretty well formed; but it never after increases in length between the symphysis and the sixth tooth; and from this time, too, the alveolar process which makes the anterior part of the arches of both jaws, never becomes a section of a larger circle. . . . After this

5. Nance, Hays N. The limitations of orthodontic treatment. Parts I and II. Am. J. Orthodont. 33:177 (April) 33:253 (May) 1947.

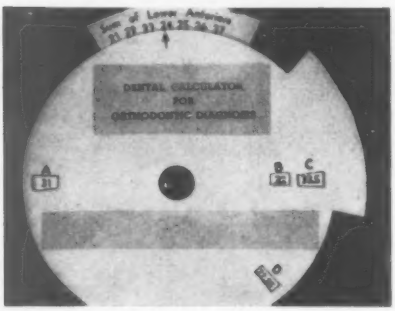


Fig. 1 • The mesiodistal diameters of the lower central and lateral incisors in the mixed dentition are measured and the arrow is set on the sum. Windows A, B and C represent the sum of the upper anterior teeth—A, small; B, average; C, large. Window D gives the sum of the diameters of the lower unerupted cuspid and two bicuspids. To this must be added 1.7 mm. molar drift to obtain calculation for the space necessary between the mesial aspect of the molar and the distal aspect of the lateral incisor

time, the jaws lengthen only at their posterior end.'"

The procedure described by Nance helps the operator to determine whether there will be sufficient room to accommodate all the permanent teeth from the mesial aspect of the mandibular first permanent molar on one side to the mesial aspect of the first permanent molar on the opposite side. The measurements, 'gured in millimeters, are recorded in ne table. They are taken as follows:

1. The distance from the distal aspect of the lateral incisor to the mesial aspect of the first molar is measured.

2. (*a*) The sum of the combined mesiodistal crown widths of the unerupted cuspid and two bicuspids is determined by direct measurement of these teeth in accurate roentgenograms.

(*b*) By measuring the mesiodistal crown widths of the four lower incisors, the mesiodistal crown widths of the unerupted cuspid and two bicuspids can be determined by means of a dental calculator described by Carey[6] (Fig. 1).

3. The difference between 1 and 2 is termed by Nance "leeway." The average leeway, or difference, as determined from Black's chart is 1.7 mm. for both sides. If there is less than 1.7 mm. difference on one side, it may reasonably be assumed that this will crowd the permanent cuspid and bicuspids more than if a greater leeway existed. In cases where there are crowded mandibular anterior teeth and a greater than normal leeway on one side, there is less indication for the removal of teeth since there is more room to move the teeth already present into the available space. This procedure will help the operator anticipate a malocclusion in the mixed dentition.

Case A in Figure 2 shows an intermediate dentition in which the leeway was less than the average 1.7 mm. The anterior arch was crowded and there was not sufficient room to accommodate the unerupted lower cuspid and two bicuspids and at the same time to allow for the straightening of the anterior teeth. The removal of teeth as an aid to orthodontic treatment was requested in this instance.

In Case B shown in Figure 2, there was sufficient room to accommodate all the teeth without resorting to the removal of the teeth.

Accidents resulting in the traumatization and possible devitalization or even loss of the maxillary anterior teeth are not uncommon, especially in those instances where an exaggerated protrusion exists. Such a condition often occurs in the intermediate dentition and treatment is definitely indicated. It is desirable to place the teeth in a more normal position so that they are not vulnerable.

HABITS AS A FACTOR IN MALOCCLUSION

The subject of habits as an etiologic factor in malocclusion has been thor-

6. Carey, C. W. Linear arch dimension and tooth size. Am. J. Orthodont. 35:762 (Oct.) 1949.

oughly reported over a period of many years. There are outstanding authorities in both medicine and dentistry who have studied the effects of mouth habits and they sharply disagree as to the incidence and degree of mouth deformities attributable to a habit.

The one habit that is always a matter of concern to parents is finger-sucking or thumbsucking. Levy[7] has found that infants who have had too little sucking to satisfy their hunger, or who were underfed or undernourished, resort to sucking their fingers or any other object which may prove satisfying to them. Thus, the child may suck his fingers either to relieve his hunger or to obtain the pleasurable sensation of finger movement against the sensitive mucous membrane of the mouth, or he may do so for both reasons. Finger-sucking at this early stage of development and continued through the preschool age of 5 or 6 causes little or no permanent physical deformity of the mouth. However, the persistence of intense finger-sucking beyond the age of 6 will tend not only to produce a more permanent change in the mouth, but also may be regarded as a symptom of some emotional disturbance of the child.

Figure 3 shows an example of an extreme mouth deformity caused by persistent, vigorous thumbsucking. The history of the patient reveals that the habit

7. Levy, D. M. Fingersucking and accessory movements in infancy: etiologic study. Am. J. Psychiat. 7:881 (May) 1928.

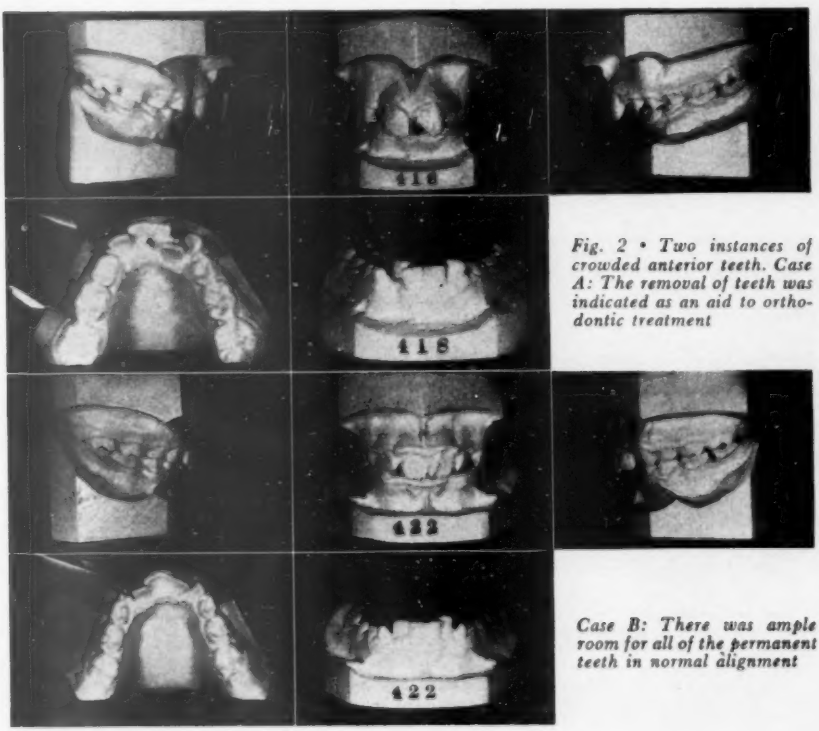


Fig. 2 • Two instances of crowded anterior teeth. Case A: The removal of teeth was indicated as an aid to orthodontic treatment

Case B: There was ample room for all of the permanent teeth in normal alignment

began at an early age and persists to the present time although the patient is now 11 years of age. The anterior arch was so contracted that there was only enough room for three lower incisor teeth instead of four.

Extreme care should be exercised in the treatment of these cases, and if the emotional disturbance is noticeably deep-seated, a psychiatric consultation may be advisable. Recommended for reading on this subject is an informative paper by Gerald H. J. Pearson, M.D.,[8] "The Psychology of Finger-sucking, Tongue-sucking and Other Oral Habits."

THE PERMANENT DENTITION

The keys to normal occlusion in the permanent dentition are the maxillary first molars and the cuspids. In normal occlusion the mesiolingual cusp of the maxillary first molar rests in the central fossa of the mandibular first molar, and the mesiobuccal cusp occludes in the buccal groove of the lower first molar. The permanent maxillary and mandibular cuspids are the pivotal points in their respective arches. Because of the shape and size of the roots and their position in the arch form, they are extremely stable and strongly resist the forces which may cause their displacement. If their position is altered by an abnormal axial inclination, rotation, or by partial or complete impaction, there will invariably be a deformity or malrelationship in some other part of the arch.

A diagnosis of malocclusion in the permanent dentition is not as difficult as in the preceding stages. The degree of the deformity will influence the decision whether or not to treat the case, keeping in mind the time, expense and the bene-

8. Pearson, G. H. J. The psychology of finger-sucking, tongue-sucking and other oral "habits." Am. J. Orthodont. 34:589 (July) 1948.

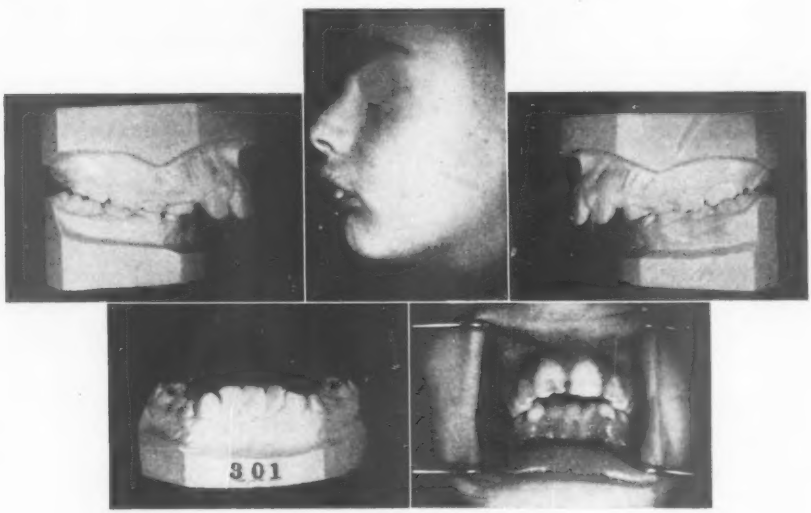


Fig. 3 • An extreme mouth deformity caused by a persistent and vigorous thumbsucking habit. Note that only three lower incisors were permitted to erupt because of the pressure against the lower anterior teeth

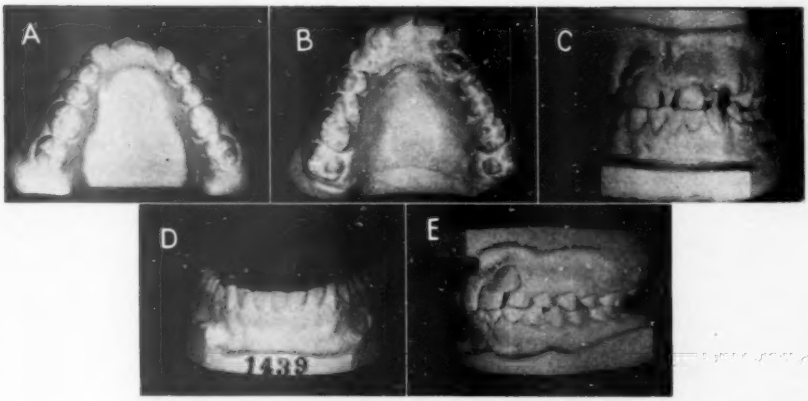


Fig. 4 • A: Two congenitally missing lower incisor teeth. B: A malformed maxillary lateral incisor. C: A supernumerary central incisor which prevented the closure of the central incisors. D: Five lower incisors present instead of four. E: The overretention of a deciduous cuspid causing the permanent cuspid to erupt mesially to its normal position

fit to the patient of a corrected malocclusion.

CLASSIFICATION OF MALOCCLUSION

Angle's[9] classification of malocclusion is currently mentioned as an aid to orthodontic diagnosis. It is not generally accepted as a guide for treatment of any particular group of malocclusions. The many types of malocclusion are condensed into three main groups. The maxillary first permanent molar is assumed to be in normal position; the relationship of the mandibular first permanent molar to the maxillary first permanent molar determines the classification. Angle's classification of the three groups of malocclusion are briefly:

Class I. Neutroclusion. The first molars are in normal position but there is a deformity elsewhere.

Class II. Distoclusion.

Division 1: Distoclusion with a protrusion of the maxillary incisors. Subdivision: Unilateral distoclusion.

Division 2: Distoclusion with a retrusion of the maxillary incisors. Subdivision: Unilateral distoclusion.

Class III. Mesioclusion. Subdivision: Unilateral mesioclusion.

A recording of the following clinical observations is helpful in the analysis of a malocclusion:

1. The number of teeth present in each jaw noting particularly excess, missing, abnormally shaped or supernumerary teeth (Fig. 4).
2. Rotations.
3. The degree of overbite or overjet.
4. The relation of the mandibular first permanent molar to the maxillary first permanent molar (Angle's classification).
5. The axial inclinations of the teeth, especially the cuspids.
6. The relation of the maxillary and mandibular cuspids to their respective arches.
7. Any obvious oral habits which may influence the normal growth and development of the teeth and jaws.
8. The curve of Spee and whether the bite is closed or open (Fig. 5).

9. Angle, Edward H. Malocclusion of the teeth, ed. 7. Philadelphia, S. S. White Dental Mfg. Co., 1907.

9. The height and shape of the palate.

10. Whether the maxillary incisors are protruded, retruded or normal.

11. Whether the mandibular incisors are crowded and, if so, the degree.

12. Whether the facial musculature is hypotonic, hypertonic or normal. The persistent habit of placing the lower lip between the teeth may upset the normal muscular action and the pressure may tend to cause a protrusion of the upper incisors and a retrusion of the lower incisors. The mouth and lip muscles counteract the anterior propelling forces of the masticatory apparatus and help maintain a normal balance. This balance may be affected when children breathe through the mouth. Strong contractions of hypertonic facial muscles may result in crowding of the arch.

13. The size and tonicity of the musculature of the tongue. A nervous habit of thrusting the tongue against the anterior teeth either can cause a protrusion or spacing of these teeth. A tongue which is disproportionately larger than the space it occupies may cause an expansion of the arch and create spaces with consequent loss of tooth contact. The habit of placing the tongue between the upper and lower incisors, regardless of the size and tonicity, may be responsible for the development of an open bite.

14. Deviations in the midline of the maxillary and mandibular teeth.

15. Whether an anterior or posterior cross-bite exists.

16. A complete roentgenographic examination which will disclose:

a. Absence of any teeth—the congenital absence of permanent tooth buds.

b. Anomalies such as supernumerary teeth (Fig. 6, A, B).

c. The size of the teeth in proportion to the crowns.

d. Abnormal development of the permanent roots.

e. Caries, pulp involvement and defective restorations.

f. Ankylosis of teeth.

g. Pathology—that is, cysts, tumors, bone disease (Fig. 6, C).

h. Bone structure—density.

The operator will undoubtedly find the above procedures time-consuming in the beginning, but with experience the time required will be greatly reduced.

EXTRACTION OF TEETH IN THE CORRECTION OF MALOCCLUSION

In order to establish a logical sequence of aids in orthodonic diagnosis, it is impossible to avoid the question of extraction of teeth as an adjunct in the correction of malocclusion. A difference of opinion exists regarding this subject. Currently, a large group of orthodontists are of the opinion that extraction of one or more teeth is essential in a high per-

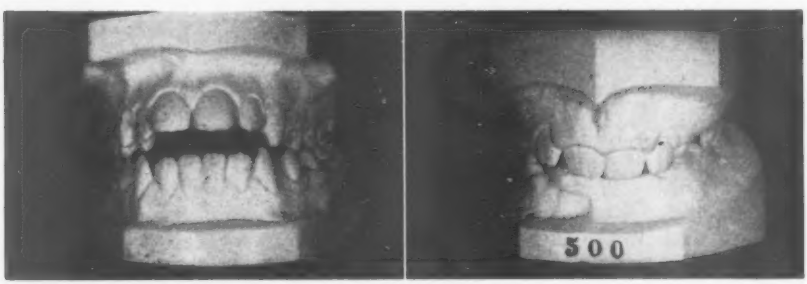


Fig. 5 • Left: Open bite. Right: Closed bite

centage of cases, while on the other hand, many orthodontists are bitterly opposed to extractions. The remaining group favors extractions in a moderate number of cases, especially when there is a discrepancy between the amount of tooth material and basal bone.

After a complete analysis of the case has been made and the orthodontist has definitely decided to extract one or more teeth prior to orthodontic treatment, he should explain the reason to the parents. The parents may have obtained a different opinion from another orthodontist and they may have to place their confidence in the judgment of the general practitioner. It is good practice for the orthodontist to discuss the case with the general practitioner and explain the reasons for the course of treatment. It is easier to convince the patient if the general practitioner is assured that the treatment is necessary and correct.

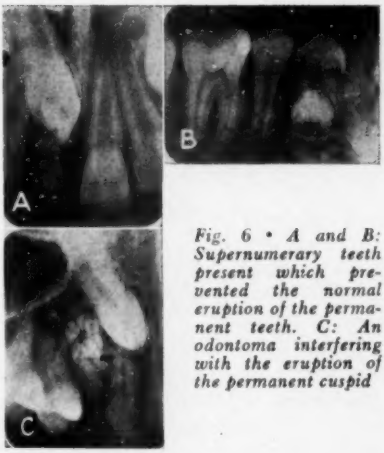


Fig. 6 • A and B: Supernumerary teeth present which prevented the normal eruption of the permanent teeth. C: An odontoma interfering with the eruption of the permanent cuspid

SUMMARY AND CONCLUSIONS

1. It is important to understand occlusion and its variations during the different stages of physiologic growth and development.

2. The time to institute orthodontic therapy for the correction of a malocclusion varies with the individual patient. The stage of development, rather than the chronologic age, is the deciding factor.

3. Certain types of malocclusion may be treated in both the deciduous and the intermediate dentition, provided the patient is amenable to treatment.

4. Malocclusion may be anticipated in the early stages of development and then the approximate time and type of therapy can be determined.

5. Early correction of dental deformities may prevent extensive treatment at a later period, and in some instances eliminates the necessity for future treatment. Furthermore, the prognosis may not be as favorable at a later period.

6. Since the general practitioner is usually the first to observe a malocclusion, he is entrusted with a great responsibility. An effort should be made to fortify him with a greater knowledge of orthodontics so that he is better equipped to make a diagnosis of malocclusion at the proper time.

15 Longview Avenue

COUNCIL ON DENTAL HEALTH

More communities take favorable action on water fluoridation process

The favorable attitude expressed by American communities regarding the fluoridation of water supplies and the rapidity with which the process is being put into effect speaks well for the future dental health of this country. By the end of 1951 it was reported that approximately 159 communities had installed water fluoridation equipment. Later reports show that favorable action on fluoridation has been taken in many additional communities. A list of these communities follows:

California • As a result of the unanimous vote of the Sunnyvale City Council, fluoridation will be effected immediately in that community.

The board of directors of the Vallejo Junior Chamber of Commerce has announced its unqualified endorsement of a proposal to fluoridate the city's water supply and has asked the Vallejo Chamber of Commerce to vote its endorsement. The board's recommendation is to be forwarded to the Vallejo City Council with a proposal that when the city's new water treatment plant is constructed, equipment be included to permit fluoridation.

San Diego may become the first large city in California to fluoridate its water supplies since operation is scheduled to begin as soon as technical plans have been approved. In San Francisco, the measure, although approved, cannot be put into effect before April 1, 1952. Rio Vista, which has a population of approximately 1,800, was the first community, starting operation October 26.

Kansas • The city of Horton recently started fluoridating its water supply with hydrofluosilicic acid and is figuring on a per capita cost of 13 cents per year, according to Willard R. Bellinger, director, division of dental hygiene, Kansas State Board of Health. The cost at Ottawa, where sodium fluoride is used, is reported to be 10 cents per capita per year.

Topeka and Junction City are said to be in the advanced stages in planning fluoridation. Other communities deliberating on the program are El Dorado, Garnett, Hiawatha, Holton, Howard, Iola, Lawrence, Leavenworth, McPherson, Seneca, Wellington, Wellsville and Wichita.

Maryland • The city of Baltimore expects to begin fluoridation for its nearly 1,000,000 citizens early in February. An appropriation of $90,000 was approved by the city council almost simultaneously with the favorable report on fluoridation by the National Research Council.

Michigan • With machinery in place and test runs for calibration purposes completed, Ann Arbor's residents started 1952 with their drinking water containing the optimum amount of fluoride. The public

health measure was approved in 1951 following a long campaign by dental and medical authorities.

New Jersey • Official endorsement of the Bergen County Medical Society executive committee marks one of the most important steps preliminary to adoption of fluoridation in that area.

Pennsylvania • Brookville, a town of 4,000 people, is the second community in the state to fluoridate its water supply, David R. Wallace, councilman, has announced.

Washington • Voters of Seattle will decide the issue of fluoridation in a "public initiative" measure March 11.

The Kirkland City Council has budgeted $5,000 for fluoridation of the water supply in 1952. Future operation costs for fluoridation are expected to be approximately $1,500 per year.

Wisconsin • A total of 103 communities has approved fluoridation in this state which pioneered the public health measure, according to a report from F. A. Bull, director of dental health, Wisconsin State Board of Health. Of this total, 65 cities now have programs in operation and 38 are awaiting the installation of equipment.

Studies show magnesium does not interfere with dental effect of water borne fluorides

There is no evidence that magnesium has any influence on the caries-inhibiting effect of fluorides, according to F. J. McClure, chief, Laboratory of Oral and Biological Chemistry, National Institute of Dental Research. Dr. McClure's report was prepared in answer to questions raised by A. E. Sobel,[1] head, department of biochemistry, Jewish Hospital, Brooklyn, in a study made recently pertaining to the calcification of skeletal tissue.

Dr. Sobel reported he found that in the presence of magnesium ion, strontium, fluoride and cyanide ions block calcification *in vitro*. None of these four ions in themselves were found to block calcification in the concentrations used. With fluoride, calcification was considerably enhanced. In the presence of magnesium, Dr. Sobel stated the same amount of fluoride completely blocked calcification *in vitro*.

Dr. McClure's experiments published in 1948,[2] pertaining to the relation of magnesium to the inhibitory effect of fluorine on rat caries, showed that 10 ppm of fluorine in a drinking water which also contained 500 ppm of magnesium reduced dental caries in rats to the same extent as did 10 ppm of fluorine alone. The same study indicated further that 500 ppm of magnesium alone in drinking water had no effect on rat caries. Additional investigation by Dr. McClure[3] furnished no indication that the explanation of the fluorine anticaries effect is

1. Sobel, A. E., and Goldenberg, H. Survival of the calcifying mechanism. Presented before the XII International Congress of Pure and Applied Chemistry, Sept. 12, 1951, New York City.

2. McClure, F. J. Observations on induced caries in rats. J. D. Res. 27:34 (Feb.) 1948.

3. McClure, F. J. Fluorine, ash, calcium, and phosphorus in human teeth. J. D. Res. 29:315 (June) 1950.

related to the total quantities of ash, calcium and phosphorus or the calcium-phosphorus ratio of the enamel and dentin.

As further evidence that Dr. Sobel's test tube findings have not been duplicated in animal or human experience, Dr. McClure's report draws also on epidemiologic studies made by H. T. Dean who early recognized the possibility that other elements in drinking water might influence the caries-preventive effects of fluorine. The studies of Dean and co-workers involved a complete mineral analysis of all water supplies in 21 cities[4,5] and showed no evidence that a variable magnesium content of water affects the anti-caries activity of water borne fluorine.

"It is our opinion that there is no justification for any concern at this time, regarding a detrimental effect of magnesium on the caries preventive effects of water borne fluorides," Dr. McClure concludes, adding, "In a letter dated October 19, 1951, Dr. Sobel agreed to be quoted as in general agreement with this concluding statement."

4. Dean, H. T. and others. Domestic water and dental caries. II. A study of 2,832 white children, aged 12-14 years, of 8 suburban Chicago communities, including Lactobacillus acidophilus studies of 1,761 children. Pub. Health Rep. 56:761 (April 11) 1941.

5. Dean, H. T.; Arnold, F. A., and Elvove, Elias. Domestic water and dental caries. V. Additional studies of the relation of fluoride domestic waters to dental caries experience in 4,425 white children, aged 12 to 14 years, of 13 cities in 4 states. Pub. Health Rep. 57:1155 (Aug. 7) 1942.

COUNCIL ON DENTAL EDUCATION

1951-1952 Dental Students' Register

The 1951-1952 *Dental Students' Register* has been completed and is now available, on request, from the Council on Dental Education. The data, as shown in Table 1, indicate a continuing increase in the number of undergraduate dental students enrolled.

The number of graduates each year is beginning to show the effect of this increase in enrollment. The establishment of three new dental schools since 1946, the availability of more students and the decrease in the mortality rate because of improved methods of selection should all tend to prolong this increase in the number of graduates each year.

The figures for undergraduate enrollment and graduated dental hygienists show a similar increase from 1947 to 1951 as indicated in Table 2.

There are now 26 schools training dental hygienists, an increase of 14 schools since 1947. Since 5 of the 26 dental hygiene schools are new and will not have a graduating class until next year, there will be an increase in the number of graduates in dental hygiene next year.

All of the dental hygiene schools require the applicant to have completed satisfactorily an approved high school course, and three will not accept applicants with less than two years of liberal arts training.

Of the 12,169 undergraduates enrolled in dental schools as of October 15, 1951, 31 per cent had two years of predental training, 26 per cent had three years, 5

Table 1 • Number of undergraduate students enrolled in dental schools and number of graduates, 1945-1951

Year	Number of undergraduates enrolled	Number graduated
1945	7,274	3,212
1946	8,287	2,666
1947	8,996	2,225
1948	10,132	1,755
1949	11,336	1,574
1950	11,891	2,565
1951	12,169	2,830

Table 2 • Number of undergraduate students enrolled in dental hygiene schools and number of graduates, 1947-1951

Year	Number of undergraduates enrolled	Number graduated
1947	720	448
1948	958	453
1949	1,091	505
1950	1,454	529
1951	1,598	632

per cent had four years without a degree and 38 per cent had a bachelor's or other degree. United States possessions furnished 121 of the 1951 undergraduates, Canada had 42 and 109 were from other foreign countries. There are 82 women students in the present undergraduate classes. There were 299 graduate students and 1,376 postgraduate students enrolled as of October 15, 1951.

Two of the 42 dental schools have accelerated programs which are required of all students while one school operates an optional accelerated program. Five dental schools require three years of predental training. Scholarships are available from 20 of the 42 dental schools.

The 1951-1952 *Dental Students' Register* also includes such data as distribution of undergraduate dental students by state, territories and foreign countries, admission requirements, admission and graduation dates, and tuition cost for the four year program.

Frederick S. McKay and Harlan H. Horner, honorary members of the Association

Honorary membership in the American Dental Association was conferred on Frederick S. McKay of Colorado Springs, Colo., and Harlan H. Horner of Albany, N. Y., at the ninety-second annual meeting of the Association in Washington, D. C., on October 17, in recognition of their contributions to the advancement of dental public health and the dental profession. Because of the specific and unique contributions which Drs. McKay and Horner have made to dentistry it is appropriate that an announcement of the honor conferred upon them and a synopsis of their accomplishments be published in this issue of THE JOURNAL. February, during which National Children's Dental Health Day is observed, has now become associated in the minds of the profession with public dental health.

Dr. McKay's early observations of mottled enamel and his determination to ascertain its cause led to the discovery of the fluoridation of drinking water—the first public health measure to prevent appreciably the incidence of dental caries.

Dr. Horner's contributions to the dental profession and to the dental health of the public were channeled through the field of dental education rather than in scientific research. During his secretaryship of the Council on Dental Education and guided greatly by his counsel the Association recognized pedodontics as a specialized branch of dentistry. Also during his term as secretary of the Council on Dental Education, the American Dental Association created basic standards for the training of dental hygienists. Both the pedodontist and the dental hygienist are indispensable in a modern dental health program.

Dr. McKay, pioneer investigator of the role of fluorides in dental health, received the honor in his fifty-first year of practice. He was graduated in the class of 1900 of the University of Pennsylvania dental school, which he entered in 1898 after matriculating from Boston Dental College (now Tufts College Dental School) in 1897.

A bibliography of nearly 50 publications under his authorship tells the story of the increasing knowledge of the role of fluorides in dental health which began with his early research on the subject. His first complete description of mottled teeth was published, with G. V. Black as co-author, in *Dental Cosmos* in 1916. It was entitled "Mottled Teeth, an Endemic Developmental Imperfection of the Enamel Heretofore Unknown in the Literature of Dentistry," and appeared in synopsis form in 1915 in the *Proceedings of the Panama-Pacific Dental Congress.* His latest article entitled "The Study of Mottled Enamel (Dental Fluorosis)" was read in October 1951 before the Section

F. S. McKay

on Dental Public Health of the American Dental Association. It is published on page 133 of this issue of THE JOURNAL.

Meantime, Dr. McKay has been actively engaged in the practice of dentistry. Five years of general practice were followed by 13 years in the practice of orthodontics. He has specialized in periodontics since 1917 when, in New York, he was associated in practice with the late W. D. Tracy. His present practice in the specialty, in Colorado Springs, dates from 1940.

His services have included that of superintendent of instruction at the Angle School of Orthodontia in St. Louis (1905-08), professor of orthodontics at the University of Denver dental school (1910-11), visiting oral surgeon at Presbyterian Hospital in New York (1925-30), consulting specialist in child hygiene for U. S. Public Health Service (1928-29), and since 1938 that of consultant on dental fluorosis to USPHS.

Many honors have come to Dr. McKay, including the Jarvie Medal from the New York State Dental Society, the Callahan Medal from the Callahan Memorial Commission in Ohio, a special award of the American Association of Public Health Dentists, and honorary membership in the Colorado State Dental Association. In addition, he has held many offices in national, state and local dental professional organizations, and has had time to balance a half century of distinguished professional life with the pursuit of his two hobbies—music, and railroads and locomotives.

Harlan H. Horner received the A.B. degree from the University of Illinois in 1901 and the M.A. degree from the State College for Teachers, Albany, N. Y., in 1915, where he also received the honorary degree of Pd.D. in 1918. After serving in various administrative educational posts in Illinois and in New York, he was dean of the State College at Albany and director of its summer session (1917-23) and executive secretary of the New York State Teachers Association and editor of its journal, *New York State Education* (1913-23). In 1931 he became assistant commissioner for higher and professional education in the New York State Education Department, and was later made associate commissioner, where he served until 1939. In this capacity he was responsible for the accrediting of colleges and professional schools by the state and the issuance of professional licenses.

Dr. Horner became secretary of the Council on Dental Education of the American Dental Association in 1940, two years after the establishment of that agency, and held the position until his retirement in 1948. His work led to the development of the present accreditation program for dental schools and to the evaluations made on the basis of the 1942-43 dental school surveys. He also assisted the Council materially in the creation of the basic requirements and standards for the approval of schools for the training of den-

H. H. Horner

tal hygienists, and schools for the training of dental laboratory technicians. It was also during this time that much of the original work was done in relation to developing standards for the approval of hospital dental internships and residencies and the establishment of basic requirements for the dental specialty boards.

Dr. Horner made a lasting contribution to dental education in his authorship of *Dental Education Today*,[1] which describes in considerable detail the functions of the Council and its accreditation of dental schools.

He has received many commendations for his work in dentistry; among them was his election to an honorary fellowship in the American College of Dentists in 1942. In addition he has been honored by state and education groups as well as by numerous learned societies. His election to honorary membership in the American Dental Association is tribute to a man who has devoted much time and energy to the maintenance and furthering of high standards in dental education.

1. Horner, H. H. Dental education today. Chicago, University of Chicago Press, 1947.

FEBRUARY 1952

LON W. MORREY, D.D.S., EDITOR
VOLUME 44 • NUMBER 2
Published by the American Dental Association
222 East Superior Street • Chicago 11, Illinois

THE Journal OF THE AMERICAN DENTAL ASSOCIATION

Editorials

Annual National Children's Dental Health Day to be observed this month

The fourth annual National Children's Dental Health Day, observed on the fourth day of this month, is a day dedicated to the children of America and to the improvement of their dental health—a day set aside by the Association and its constituent and component societies to focus attention on the need for making more and better dental health service available to children and youth and to stimulate dentists to provide the services sought.

Never before has it been possible for dentistry to furnish the measures now available to maintain the mouths of children in a healthy condition. If the caries preventive and control methods now known are used to full extent, there is small reason for many children in most communities reaching adulthood with wrecked and infected mouths. Close adherence to a well balanced, low sugar diet, good oral hygiene practices, early and regular dental care, the topical application of sodium fluoride and the fluoridation of communal drinking water provide today's children with dental protective measures undreamed of a few decades ago.

It is improbable that W. D. Miller fully realized the impact which his theory of dental caries would have eventually on the nutritional habits of an informed society. It is unlikely that Thaddeus P. Hyatt, coiner of the term "prophylactic odontotomy," dreamed that the pit and fissure technic which he championed would, within 25 years, become common practice. Little did the Forsyth brothers and George Eastman and Robin Adair, early founders of children's dental dispensaries, foresee that dentistry for children would become a major specialty of the profession, emphasized in the curriculum of every American dental school and dignified by the term "pedodontics."

Little did A. C. Fones, founder of the first training school for dental hygienists, anticipate that within the short space of two generations extensive courses for hygienists would be established in 26 teaching institutions in this country. It is improbable that W. G. Ebersole and his associates on the Oral Hygiene Committee of the Association conceived that the Cleveland Marion School dental program in 1909 would spread to practically every school system from coast to coast. Lastly, it is unlikely that Frederick S. McKay, intrigued by the unsightly dental disfigurations found among individuals living in certain areas, foresaw that his early observations would lead to the development of a simple, inexpensive water fluoridation process that substantially prevents dental caries. All of these measures have proved their worth and received the endorsement of the profession. All that remains to be done is for each community to apply them intelligently.

National Children's Dental Health Day is one means of making these measures known to society. It is one method of motivating parents, teachers and public health workers to apply them for the good of the younger generation. It is a means of reminding members of the profession of their constant responsibility to youth. National Children's Dental Health Day should not be considered as a flash in the pan but a flame which will enable civic leaders to kindle a continuous dental health program for the children in each community.

The sterilization of dental handpieces

A recent article by Jerome B. Casey on the sterilization and maintenance of dental handpieces[1] under tropical conditions serves as a reminder that these are problems more or less common to all dentists. Modern aseptic methods enable the practitioner, working under normal climatic conditions in this country, to sterilize all of his operating instruments without injuring them seriously, yet some dentists who cringe at the thought of using an unsterilized forceps or hand instrument unconcernedly transfer an unsterilized handpiece from the mouth of one patient to another. From the standpoint of asepsis and propriety the dental handpiece remains the one weak spot in many dental offices.

Dr. Casey reports that naval dental officers in the tropics have partially solved the problem by immersing the handpieces for 10 to 30 minutes in the unit spray bottle filled with light liquid petrolatum and turning the control on full force. Since the temperature of the oil never rises above 230° F. no fire hazard is involved. Handpieces, like other instruments, should be cleaned carefully before being sterilized as the presence of blood and other matter may interfere with the process.

The Council on Dental Therapeutics[2] of the Association calls attention to devices now available in which oil or silicone fluid is used as a medium to bring the temperature of instruments up to disinfecting levels. Silicone fluids, insoluble in water, are soluble in carbon tetrachloride, chloroform, xylene and paraffin oil. Certain of these fluids exhibit low volatility, high flash point and stability at high temperatures below the flash point. These qualities make them suitable for use in the disinfection of handpieces by heat. Although silicone fluids are considered chemically inert not all

of them can be used for sterilizing purposes as some are irritating to the tissues. It is reported also that they have less lubricating qualities than hydrocarbon oil.

It is hoped that research now in progress will provide still more convenient methods of sterilization. Until better methods are perfected the use of sufficiently heated silicone fluids or light liquid petrolatum for sterilization is indicated. There is sufficient evidence at hand to indicate that immersing handpieces in light liquid petrolatum or silicone fluid at 125° C. for 15 minutes destroys most vegetative organisms. This simple method combined with the alternate use of several handpieces will partially, if not entirely, eliminate the possibility of this instrument's becoming a carrier of infection.

1. Casey, Jerome B. A method of sterilizing and maintaining the dental handpiece. U. S. Armed Forces Med. J. 2:1587 (Oct.) 1951.

2. Council on Dental Therapeutics. Accepted dental remedies, ed. 17. Chicago, American Dental Association, 1952, p. 77.

Dentistry and the civil defense program

The Association has established a mechanism by means of which the dental profession can cooperate more effectively with civil defense efforts at local, state and national levels through the appointment of a subcommittee of the Special Committee on National Emergency Dental Service.[1] This new committee has an extremely important assignment. Although the civil defense program is now in its second year, it has lagged tremendously, largely because of general indifference. The primary reason for the indifference is obvious; the program is designed for an emergency that may or may not occur. A second reason, perhaps, lies in the lack of dynamic leadership. The administrative structure of the program, loosely assembled on an individual state basis, is so uncoordinated that it has attracted little public support at the grass root level. True, every state and some communities have set up civil defense organizations, but so far their plans are largely on paper.

As for the apparent lag in dental interest in the program, the basic reason is that in few communities have dentists or dental societies been invited to participate in the planning or been assigned specific duties. A civil defense administrator who would make full use of the resources in his area would not overlook the potentials of the dental profession. He would insist that its members participate in his planning and that they assume definite responsibilities in carrying out such plans.

It would seem that the fundamental task of the new subcommittee on civil defense of the Association should be to stimulate constituent and component dental societies to obtain active representation on existing state and local civil defense organizations. Once this objective has been accomplished the committee might well direct its efforts toward aiding in the establishment of training programs for dentists which will enable them to function efficiently in the event that a catastrophe occurs.

Should this country be attacked by atomic, bacterial or chemical weapons every member of the health professions will rush, with the best of intentions, to the aid of the injured. Good intentions are fine, but good planning and training are better. Dentistry has much to offer in a civil defense program. It remains to be seen whether that offer will be accepted.

1. See page 217 of this issue.

Washington News Letter

President Truman's recent establishment of a special commission, responsible directly to him, to study national health needs and make appropriate recommendations has served to shift the spotlight from Capitol Hill to the government's executive branch. Little is expected of the new session of Congress as far as enactment of any major legislation relating to dental or medical services is concerned. On the other hand, Washington observers feel that the new Magnuson commission is a potentially powerful factor in influencing not only the future course of health legislation but also the plans and policies of nongovernmental institutions and enterprises.

Specifically, these students of the Capital scene believe that the hearings which the commission will conduct—beginning this spring—and the interim reports it will make public are likely to make their weight felt in the fields of professional education, health economics and clinical practice itself. It is not that this 15 member group will have authority to effect any changes but, rather, that the facts and figures which it purposes to develop and publicize may lead more or less spontaneously to important reforms.

The commission's scope of inquiry, as defined in the President's executive order, is broad, indeed. It is directed, for example, to study the current and prospective supply of physicians, dentists and allied professional people . . . local public health requirements . . . relocation of physicians and dentists to accommodate population shifts in the mobilization program . . . medical and dental research . . . adequacy of private and public programs designed to provide methods of financing health care.

In connection with the last-mentioned matter, President Truman informed Congress in his State of the Union message on January 9 that he still believes national health insurance is the best way to meet the economic problem of health care. "If there are any better answers, I hope this Commission will find them," he stated. "But of one thing I am sure; something must be done, and be done soon."

On January 14 and 15, the President's Commission on Health Needs of the Nation held its first meeting, with Chairman Paul B. Magnuson presiding. Among members in attendance was Ernest G. Sloman, of San Francisco, representative of the dental profession on the commission. He expressed satisfaction with the spirit and determination manifested at the organization session. Dr. Magnuson did likewise, stating that it was heartening for a newly created group to embark upon a study with such unanimity of purpose and objectivity, even though it appreciates the controversial character of many of the problems it will tackle.

Headquarters of the commission are at 901 Sixteenth Street Northwest. Its next meeting is scheduled for February 12-13. Present plans call for meetings at least once a month thereafter, some of which will be held in conjunction with public hearings to gather facts and opinions.

Col. George F. Jeffcott, Army Dental Corps, who has been stationed in Stuttgart, Germany, since 1949, has been ordered to duty in the office of the Surgeon General to take charge of the dental standards branch. During his stay in Europe, Col. Jeffcott was active in helping reorganize the German dental school system. As an historian, he is an authority on the Dental Corps' role in World War II.

Lieut. Col. Kenneth C. DeGon, who has been chief of the dental standards branch, has been transferred to Fort Myer, Va., where he will head the dental clinic.

According to latest compilation by Selective Service headquarters, there are 3,929 dentists in Priority I who have registered to date under the so-called doctor-draft law. Of this number, 1,132 have been commissioned in one of the military services and are on active duty; 1,060 are members of Reserve components but have not yet been called into uniform; 571 are in 4-F deferment status; 287 are deferred because of essentiality in their present civilian pursuits, and 98 because of family dependency obligations.

In Priority II, total registration is 731, of whom 141 are on active duty, 147 in Reserve units, 80 on "essential deferment" list and 140 in 4-F.

Reserve officers of the Dental Corps and other branches of the Navy's medical department have been invited to apply for enrollment in the intensive course on special weapons and radioactive isotopes which will be held at the Naval Medical Center February 11-16, inclusive. The six-day session is open to Reserves living in the First, Third, Fourth, Fifth, Sixth, Eighth and Ninth Naval Districts, also those in Potomac River Naval Command.

Association Affairs

COUNCIL ON MEMBERSHIP ISSUES FINAL 1951 REPORT

Total membership in the American Dental Association decreased 1.1 per cent during the past year, while student membership increased 7.5 per cent, it was announced by the Council on Membership December 31, 1951.

Total dues paying membership numbers 76,229, as compared with 77,099 on December 31, 1950. This total includes active and life members who are fully privileged, affiliate, associate and honorary members, and students. Student members total 9,088, an increase of 7.5 per cent over the 1950 figure of 8,450. Members whose 1952 dues are not received in the Central Office by March 1 will be removed from membership rolls and their copies of THE JOURNAL discontinued until they have been reinstated, it has been announced by Harold Hillenbrand, secretary of the Association.

COMMITTEE TO INVESTIGATE CRISIS IN MANPOWER, SUPPLIES

Surveys to determine the extent of manpower reserve in dentistry were recommended by the Special Committee on National Emergency Dental Services, at its meeting December 19 in the Central Office.

The manpower problem facing dentistry centers in two acute areas, the committee agreed. These are the replacement of rotating personnel for service in military dental corps, and the inactivity of the Selective Service system regarding priority I and II dentists. To clarify these and other problems, the special committee passed three resolutions seeking surveys of students, faculties and reserve officer training programs. The first two, to be conducted by the Council on Dental Education, will investigate the present population of dental schools, including the potential draft status of students and the number of faculty vacancies in these schools.

The third survey, to be conducted jointly by the Council on Federal Dental Services, the Council on Dental Education, and the Council on Legislation, will review programs in effect in dental schools affecting deferment policies, including ROTC units.

The growing shortage of dental equipment was discussed on December 20, as the Special Committee met with members of the American Dental Trade Association.

The A.D.T.A. representatives reported that increased federal orders for dental equipment, together with reduced allocations of critical materials, have sharply reduced the supply of units, chairs, sterilizers, cabinets, and lights for civilian use.

To gather further information on an equipment distribution plan, the Special Committee appointed a subcommittee to survey the utilization of materials and supplies in the Armed Forces. The subcommittee consists of E. Harold Gale of Albany, N. Y., chairman of the Council on Legislation; R. H. Friedrich of Plainfield, N. J., chairman of the Council on Federal Dental Services; and Frederick W. Herbine of Reading, Pa., chairman of the Council on Dental Trade and Laboratory Relations. Francis J. Garvey, secretary of the Council on Legislation, was appointed secretary of the subcommittee.

The Special Committee on National Emergency Dental Service is composed

of LeRoy M. Ennis, chairman; R. H. Friedrich, vice-chairman; Harold Hillenbrand, secretary; E. H. Gale; Eugene R. Westcott of Atlantic City, N. J., chairman of the Council on Dental Education; Russell W. Bunting of Washington, D.C., dental consultant to the Office of Health Services and Special Weapons Defense, of the Federal Civil Defense Administration; Leo J. Schoeny of New Orleans, dental member of the Health Resources Advisory Committee of the Office of Defense Mobilization, and James P. Hollers, of San Antonio, Tex., dental consultant to the Armed Forces Medical Policy Council. All but Dr. Hollers were present at the committee meetings.

NEW SLIDES ON FLUORIDATION OFFERED FOR RENT, PURCHASE

The Council on Dental Health has prepared a series of 35 mm. projector slides entitled "Fluoridation in the Prevention of Dental Caries." The series may be used by dentists and members of health agencies for showing to local groups.

The series of 51 slides and a speaker's guide explaining each, may be rented for $1.50 a day or $3.50 a week. Rental requests should be sent to the Bureau of Library and Indexing Service, American Dental Association, 222 East Superior Street, Chicago 11. Requests require 10-14 days for delivery.

The slides may also be purchased individually from the Association's Order Department, and selection of about 15 slides per program is advised. The slides and speaker's guide may be borrowed for preview prior to purchase.

RELIEF FUND DRIVE REACHES THREE FOURTHS OF GOAL

Approximately 75 per cent of the $100,000 goal of the American Dental Association's Relief Fund had been contributed on January 15, and contributions to the fund were slightly above those received for the corresponding period last year. Almost 25,000 dentists had donated $75,751.25 for an average contribution of $3.04.

Reports on individual constituent societies were available only up to the January 1 accounting period. As of that date, seven societies had contributed more than their goals. They were Alabama, Alaska, Hawaii, North Dakota, Oklahoma, Tennessee and Wyoming. Six state societies had reached more than 90 per cent of their goals: Idaho, Indiana, Montana, Nebraska, New Mexico and Washington.

Donations to the Relief Fund are used to aid needy dentists and their families. Half of each contribution is placed in the Association's Relief Fund and half is returned to the relief fund of the state society of which the donor is a member.

The drive will continue through February. Leo W. Kremer of Chicago, chairman of the Council on Relief, invites the 50,000 Association members who have not contributed, to send their donations to the American Dental Association Relief Fund, 222 East Superior Street, Chicago 11.

Contributions by constituent societies as of January 1 follow:

	1951-52 Quotas	To Jan. 1 Contributions	Pct.
Air Force	$ 460.00	$ 251.25	54.6
Alamaba	740.00	1,340.00	181.1
Alaska	40.00	75.00	187.5
Arizona	260.00	122.00	46.9
Arkansas	480.00	421.50	87.8
Army	480.00	282.50	58.9
California	3,540.00	2,747.50	77.6
California, So.	4,340.00	2,714.00	62.5
Colorado	940.00	515.50	54.8
Connecticut	1,910.00	1,486.50	77.8
Delaware	150.00	124.00	82.7
Dist. of Col.	840.00	684.50	81.5
Florida	1,180.00	955.50	80.9
Georgia	1,020.00	692.00	67.8
Hawaii	350.00	354.00	101.1
Idaho	260.00	244.00	93.8
Illinois	7,750.00	6,128.50	79.1
Indiana	2,280.00	2,151.50	94.4

Iowa	1,900.00	1,440.65	75.8
Kansas	1,060.00	785.80	74.1
Kentucky	1,060.00	522.50	49.3
Louisiana	1,010.00	592.25	58.6
Maine	450.00	307.50	68.3
Maryland	1,010.00	897.00	88.8
Massachusetts .	3,780.00	2,802.00	74.1
Michigan	3,900.00	2,784.50	71.4
Minnesota	2,970.00	2,315.83	77.9
Mississippi	530.00	362.60	68.4
Missouri	2,550.00	1,892.50	74.2
Montana	360.00	342.15	95.0
Navy	850.00	317.50	37.4
Nebraska	1,100.00	1,091.00	99.2
Nevada	90.00	56.50	62.8
New Hampshire	300.00	250.00	83.3
New Jersey ...	4,110.00	3,321.50	80.8
New Mexico ..	200.00	189.50	94.8
New York	15,620.00	7,673.00	49.1
North Carolina	1,250.00	588.00	47.0
North Dakota .	330.00	474.00	143.6
Ohio	4,940.00	3,383.00	68.5
Oklahoma	880.00	1,096.00	124.5
Oregon	1,170.00	1,024.00	87.5
Panama C. Z. .	20.00	7.00	35.0
Pennsylvania ..	7,190.00	4,533.08	63.0
P. H. Service ..	240.00	116.50	48.5
Puerto Rico ..	280.00	84.00	30.0
Rhode Island..	550.00	413.00	75.1
South Calorina	430.00	212.00	49.3
South Dakota .	340.00	221.00	65.0
Tennessee	1,110.00	1,142.25	102.9
Texas	3,010.00	1,759.10	58.4
Utah	480.00	183.00	38.1
Vermont	190.00	90.00	47.4
Vet. Admin. ...	990.00	291.50	29.4
Virginia	1,120.00	785.50	70.1
Washington ..	1,690.00	1,630.00	96.4
West Virginia .	770.00	601.00	78.1
Wisconsin	2,990.00	1,875.50	62.7
Wyoming	160.00	167.00	104.4
Miscellaneous .		23.00	
Totals $100,000.00		$69,933.46	69.9

AD INTERIM APPOINTMENTS MADE TO TWO COUNCILS

LeRoy M. Ennis, president of the Association, has made two *ad interim* appointments to Association Councils. J. S. Eilar of Albuquerque, N. M., has been named to the Council on Insurance, to succeed R. M. Dunn of Oklahoma, deceased. Charles C. Poindexter of Greensboro, N. C., has been appointed to the Judicial Council, to succeed Henry O. Lineberger of North Carolina, deceased. The new designates will serve until the next annual meeting, when successors will be elected.

DEFENSE BOND APPEAL ADDRESSED TO DENTISTS

In mid-February, members of the dental profession will receive the third in a series of letters from Harold W. Oppice of Chicago, immediate past president and national bond chairman of the Association, urging them to participate in the Bond-a-Month savings plan.

Sponsored by the National Professional Association Advisory Committee for Defense Bonds, the letters explain the important patriotic and economic reasons for the regular purchase of U. S. Defense Bonds.

The letters also stress the value of retaining matured bonds for an additional ten years. Bonds which were purchased ten years ago may be held for an additional period at the same interest rate. Under this plan, each $100 invested in bonds would be valued at $177 at the end of the twenty-year period.

By buying and holding bonds, Dr. Oppice pointed out, the dentist is helping to check inflation, he is aiding the defense effort, and is providing himself with a safe, farsighted savings program.

SUBCOMMITTEE TO SUGGEST CIVIL DEFENSE PROGRAM

The subcommittee on civil defense, recently named by the Special Committee on National Emergency Dental Services, met on December 20 in the Central Office, to formulate plans for the participation of dentists in the civil defense program.

David Hunn, chairman, Troy, N. Y., and John R. Abel of Beverly Hills, Calif., met with Russell W. Bunting, den-

tal consultant to the Office of Health Services and Special Weapons Defense of the Federal Civil Defense Administration. Lloyd Rogers of Detroit, the third member of the subcommittee, was absent.

To determine the areas of national defense in which dentistry can use its particular skills, the subcommittee will send questionnaires to all state societies, requesting information on local organization. Findings, together with recommendations of the subcommittee, will be submitted to the special committee for action, it was announced by Dr. Hunn.

TWO CENTRAL OFFICE STAFF APPOINTMENTS ANNOUNCED

Two staff appointments have been announced by Harold Hillenbrand, secretary of the Association.

Helaine S. Levin has been appointed an assistant librarian in the Bureau of Library and Indexing Service. Miss Levin will care for the library's expanded collection of motion picture films, slides and film strips on dental health and technical subjects. As program director in the Port of New York and Europe for the United Seamen's Service, she introduced the use of film programs for the American and foreign seamen. Since coming to Chicago, she has promoted the use of 16 mm. educational films as midwest correspondent of *Film News* magazine and secretary of the Chicago Film Council. Miss Levin took her bachelor of arts degree from Hunter College and her master of arts degree from Columbia University.

Reginald H. Sullens, part-time staff member of the Council on Dental Education for the past year, has been appointed director of the Division of Educational Measurements. He will work with the Council's aptitude testing program and with the conduct of the several surveys sponsored by the council. A former instructor at the Morgan Park Military Academy and Junior College, Chicago, Mr. Sullens earned his bachelor's and master's degrees in education from Northwestern University and is working toward his Ph.D. in educational measurement at the University of Chicago.

MEETING STUDIES DENTAL EDUCATION, LICENSING

The value of basic science textbooks in dental schools and the validity of certain kinds of licensure examinations were to be studied at the eighth annual Congress on Dental Education and Licensure, on February 2 in Chicago.

The all-day meeting of more than 250 dental educators and examiners, sponsored by the Council on Dental Education of the Association, was to feature panel discussions with audience participation.

Harry Lyons, dean of the School of Dentistry, Medical College of Virginia, Richmond, was chosen to serve as moderator of the morning session considering the effectiveness of certain types of science textbooks for dentistry students. Arthur W. Easton of Norway, Me., president of the Maine Board of Dental Examiners, agreed to serve as moderator of the afternoon panel discussing types of licensure examinations which most effectively measure a dentist's capabilities. Eugene R. Westcott of Atlantic City, N. J., is chairman of the Council and presiding officer of the Congress.

COUNCIL ON DENTAL HEALTH OUTLINES PROGRAM FOR 1952

The current movement to incorporate dental services into the health plans of industrial unions was discussed at the meeting of the Council on Dental Health, January 17-19 in the Central Office.

The Council currently is collecting information on the number and types of

industrial dental hygiene programs in the U.S., and a report of this survey will be published in an early issue of THE JOURNAL.

All members of the council attended the three-day program planning session to organize projects for 1952, which include the development of additional dental health education material and the distribution of special information kits on fluoridation and other methods of dental caries control.

INNOVATIONS TO MARK ANNUAL SESSION IN 1952

A general scientific meeting, in which all individual sections will combine for a panel discussion of antibiotics in dentistry and the foci of infection theory, is planned for the 1952 annual session of the Association in St. Louis, September 8-11.

Proposals for this combined session and for the entire scientific program were presented at a meeting of the Council on Scientific Session in the Central Office, January 11-12, as William A. Garrett of Atlanta, Ga., Council chairman, met with officers of the eleven scientific sections.

Under the present plan, there will be a reduction in the number of essays, to be heard Tuesday afternoon, all day Wednesday and Thursday morning. The Wednesday morning session, instead of being devoted to individual section meetings, will feature the combined discussion on antibiotics and foci of infection.

Technical improvements have been arranged for television clinics, to be presented all day Monday, the opening day, and Tuesday morning. The televised demonstrations will be viewed on a larger screen than at previous meetings, according to the subcommittee for television clinics. William S. Brandhorst of St. Louis has been named chairman of this subcommittee, succeeding Lester W. Burket of Philadelphia, who will remain on the committee as a member.

Table clinics will be presented on Tuesday morning and Thursday afternoon.

On March 1, a special housing bureau will open in St. Louis to process all applications for hotel accommodations for the meeting. The March issue of THE JOURNAL will publish official hotel reservation forms. Applications for hotel reservations must be made on the official application form and sent to the Housing Bureau.

Dental Societies

CHICAGO MIDWINTER MEETING TO HEAR SENATOR BYRD

Sen. Harry F. Byrd (D., Va.) will address the 87th annual Midwinter Meeting of the Chicago Dental Society, to be held February 3-7 in the Conrad Hilton Hotel, Chicago. Sen. Byrd's speech is scheduled for February 4.

The prize-winning essay in the society's annual competition will be presented during the scientific program. It is "Salivary and Pulpal Contributions to the Radiophosphorus Uptake in the Enamel and Dentin of Rhesus Monkeys." The authors, Reidar F. Sognnaes and James H. Shaw of Boston, will receive a $500 award.

A new feature, a symposium on "What the Dentist Should Know about Himself," will invite audience participation. Panel members will include Edward J. Ryan of Evanston, moderator; William T. Heron, psychologist at the University

of Minnesota; Abraham A. Low, psychiatrist of Chicago, and J. C. A. Harding of San Diego, Calif.

Clinics, motion pictures, displays and health and educational exhibits will complete the scientific program, which opens February 4. Harold H. Hayes is general chairman of the meeting, and Lyle F. Aseltine is program chairman.

Further information may be obtained from Karl L. Richardson, executive secretary, Chicago Dental Society, 30 North Michigan Avenue, Chicago 2.

KENTUCKY HONORS THOMAS AT STATE MEETING IN APRIL

The Kentucky State Dental Association will honor Robert P. Thomas at a luncheon April 1, in recognition of his years of service in organized dentistry. The luncheon will be a feature of the ninety-second annual session of the state society, to be held March 31-April 2, in the Brown Hotel, Louisville.

R. P. Thomas

Dr. Thomas, a member of the Board of Trustees of the American Dental Association, has served the dental profession with distinction during the last 40 years. The son of a dentist and grandson of a dentist, he was born in Glasgow, Kentucky in 1891. He was graduated from the Louisville College of Dentistry in 1911 and immediately entered private practice.

For 16 years Dr. Thomas served on the Kentucky State Board of Dental Examiners and for several terms was its president. He is a past president of the Louisville District Dental Society, the Kentucky State Dental Association and the American College of Dentists. For 16 years he was secretary of the American Association of Dental Examiners.

Dr. Thomas helped to form the American Dental Association's Council on Dental Education, serving on the organizing committee as a representative of the American Association of Dental Examiners. He was also a member of the Council on Dental Education from 1939 to 1946.

Information on the luncheon and other events of the Kentucky State Dental Association's annual meeting may be obtained from A. B. Coxwell, secretary treasurer of the organization, 1979 Douglass Blvd., Louisville 5, Ky.

MINNESOTA DENTAL MEETING TO BE HELD FEBRUARY 18-20

Controversial phases of oral surgery will be discussed at the dental forum of the Minnesota State Dental Meeting, to be held February 18-20 in the St. Paul Auditorium.

The oral surgery forum will feature Edward Stafne, Rochester, Minn. as moderator. Harold W. Krogh of Washington, D.C., will speak on "Extraction of Teeth in Presence of Infection"; L. M. FitzGerald of Dubuque, Iowa, will speak on "Impacted Teeth," and Wesley Spink, a Minneapolis physician, on "Use of Antibiotics in Dentistry."

Other highlights of the program will be essays on endodontics, silver amalgam, precision attachments and fixed bridge prosthesis. Further information may be obtained by writing to C. V. E. Cassel, 242 Lowry Medical Arts Building, St. Paul, Minn.

THOS. P. HINMAN CLINIC TO BE HELD IN ATLANTA MARCH 23-26

The Thomas P. Hinman Mid-Winter Clinic, under the auspices of the Fifth District Dental Society of Georgia, will be conducted March 23-26, in the Municipal Auditorium, Atlanta, Ga. General chairman of the clinic is R. D. Robinson of Atlanta. J. A. Broach is exhibit chairman; Joseph Eberhart, co-chairman.

Communications regarding the clinic should be addressed to Mrs. Dorothy Thurston, executive secretary of the Fifth District Dental Society, 1105 Doctors Building, Atlanta, Ga.

HOSPITAL DENTAL CLINIC'S 50TH ANNIVERSARY OBSERVED

When the 50th anniversary of the Philadelphia General Hospital dental clinic was observed on December 12, the guest of honor was Robert H. Ivy, who joined the clinic in 1901 as its first intern. Dr. Ivy is now director of the cleft palate division of the Pennsylvania health department.

During the anniversary program, the Philadelphia County Dental Society presented to the hospital a plaque commemorating the founders of this first hospital dental clinic in the United States.

Featured speakers at the observance included Rufus S. Reeves, director of health of the city of Philadelphia; Pascal Lucchesi, medical director of the Philadelphia General Hospital; Albert L. Borish, president of the Philadelphia County Dental Society; and LeRoy M. Ennis, president of the American Dental Association.

DISTRICT OF COLUMBIA SOCIETY MEETS MARCH 9-12

The District of Columbia Dental Society will hold its 20th annual postgraduate clinic, March 9-12, 1952, at the Shoreham Hotel, Washington, D.C. Courses to be offered include: roentgenology, by Harrison M. Berry, Jr., of Philadelphia; children's dentistry, John C. Brauer of Chapel Hill, N. C.; periodontics, G. R. Lundquist of Chicago; crown and bridge, Andy W. Sears of Jacksonville, Fla.; oral dynamics, Thomas H. Forde and James J. Greeves of Washington, D.C., Edward Koltisko of Falls Church, Va., and John T. McSweeney of New York; prosthodontics, Lynn C. Dirksen of Silver Springs, Md., and Paul A. Miller of Washington, D.C.; endodontics, W. J. Hedman of Bethesda, Md.

General chairman of the clinic is J. Garrett Reilly. Communications may be addressed to Edward H. Steinberg, executive secretary, District of Columbia Dental Society, 1835 Eye Street, N.W., Washington 6, D.C.

Robert H. Ivy of Philadelphia (center) was the guest of honor at the 50th anniversary observance of the Philadelphia General Hospital's dental clinic. When he joined the clinic in 1901, Dr. Ivy became the first hospital dental clinic intern. Shown with him are (l. to r.): P. E. Bomberger of Lancaster, Pa.; Albert L. Borish, president of the Philadelphia County Dental Society; Pascal Lucchesi, medical director of the hospital; and LeRoy M. Ennis, president of the American Dental Association.

Dental Education

ROY O. GREEP NAMED DEAN OF HARVARD DENTAL SCHOOL

Roy O. Greep, dental educator and contributor to dental research, has been appointed dean of the School of Dental Medicine, Harvard University, effective February 1. Dr. Greep has been professor of dental science at the school since 1944. He received his Ph.D. degree from the University of Wisconsin in 1934 and formerly was a staff member of the Squibb Institute for Medical Research.

Reidar F. Sognnaes, associate professor of dental medicine, has been appointed associate dean of the school.

Dr. Greep replaces James M. Dunning, who has completed his five-year term of service as dean. Dr. Dunning will return to the private practice of dentistry, but will continue his teaching at the dental school.

TWO INTERNSHIPS AVAILABLE IN SAN FRANCISCO HOSPITALS

The San Francisco County Hospital and the University of California Hospital in San Francisco are each offering an internship in oral surgery. Application forms may be obtained by writing to Willard C. Fleming, dean of the College of Dentistry, University of California Medical Center, San Francisco 22.

BAYLOR DENTAL SCHOOL DEAN, GEORGE L. POWERS, RESIGNS

The resignation of George L. Powers as dean of the Baylor University dental school was announced in the December issue of the *Baylor Dental Journal*. In an open letter, Dr. Powers expressed his thanks to the school administrators, students, faculty, and alumni. He also thanked the dental profession for its cooperation, citing particularly the Council on Dental Education of the American Dental Association, and the American Association of Dental Schools.

Dr. Powers will remain at Baylor until a new dean is appointed; thereafter, he will enter private practice of dentistry in Dallas.

GRADUATE DENTISTS OFFERED TEACHER TRAINING FELLOWSHIP

The American College of Dentists is offering fellowships to qualified dentists who wish to obtain graduate training for teaching careers. The fellowships, providing for annual stipends of $2,500 each, are designed to help dental schools in recruiting and preparing teachers.

Candidates for fellowships must have responsible teaching positions upon completion of their training, and they must agree to accept the positions for which they are being trained. Candidates must also be recommended by the dean and executive committee of the dental school at which they are teaching or plan to teach.

Further information and application forms will be supplied on written request to: Harry Lyons, chairman of the Committee on Education, American College of Dentists, School of Dentistry, Medical College of Virginia, Richmond, Va.

TWO FELLOWSHIPS OFFERED IN CHILDREN'S DENTISTRY

Two graduate fellowships in dentistry for children are available to dentists at the University of Michigan through the Charles Stewart Mott Foundation of Flint, Mich. Each fellowship provides for 12 months of formal graduate study at

the University of Michigan graduate dental school. A living stipend of $125 per month is offered and tuition is paid for two semesters and the ensuing summer school session.

After completing the formal instruction, the candidate agrees to work for 12 months at the children's clinic of the Mott Foundation Health Center, Flint, Mich. for a salary of $4,400. Candidates must meet entrance requirements at the University's school of graduate studies.

Further information may be obtained by writing to Kenneth A. Easlick, professor of dentistry, School of Dentistry, University of Michigan, Ann Arbor.

DENTAL SCHOOLS SCHEDULE POSTGRADUATE COURSES

Emory • Two courses for orthodontists will be offered by Emory University dental school, Atlanta, Ga., during February and March. Cephalometrics, an advanced course in diagnosis for orthodontists, will be taught by J. William Adams, February 18-20. A course in advanced orthodontics, including the philosophy and principles of the Universal appliance, will be taught by Spencer Atkinson, Joseph Eby, George Boone and John Arakian, March 17-19.

Further information may be obtained from Frank F. Lamons, chairman of the orthodontics department, Emory University School of Dentistry, Atlanta, Ga.

Kansas City • Six postgraduate courses will be offered at the University of Kansas City dental school during March:

Oral pathology and diagnosis by Lester Burket, March 7-8; oral surgery by Reed O. Dingman, March 7-8; airbrasive technic by Carl W. Sawyer, March 8-15; orthodontics by Wendell L. Wylie, March 12-13; full denture prosthesis by Irving R. Hardy, March 12-14; and crown and bridge prosthesis by Stanley D. Tylman, March 12-14.

Further information may be obtained from Joseph F. Jacobs, director of the postgraduate division, University of Kansas City School of Dentistry, Kansas City 6, Mo.

Louisville • Nine postgraduate courses in general anesthesia will be offered during 1952 by the department of oral surgery at the University of Louisville dental school.

Further information may be obtained by writing to Robert Sprau, chairman of the postgraduate committee, University of Louisville School of Dentistry, Louisville 2, Ky.

Ohio State • Eleven postgraduate courses in dentistry will be presented by the Ohio State University dental school in April and May. They are:

Oral pathology and diagnosis, April 7-11, by H. B. G. Robinson; general anesthesia, April 7-11, by Morgan L. Allison; partial denture prosthesis, April 14-18, by Victor L. Steffel; crown and bridge, April 28-May 2, by Frank C. Starr; full denture prosthesis, May 5-9, by Carl O. Boucher; oral surgery, May 5-9, by D. P. Snyder; periodontics, May 12-16, by John R. Wilson; endodontics, May 19-23, by J. Henry Kaiser; anatomy of head and neck, June 9-13, by Linden F. Edwards; airbrasive technic, April 7-11, by John P. Beckwith, and May 12-16, by John N. Bowers.

Enrollment in each class is limited to 10, except endodontics, to which only five students will be admitted. Fee is $50 per course, with the exception of endodontics, oral surgery and airbrasive technic, for which a fee of $100 is charged. Further information and application may be obtained from the postgraduate division, College of Dentistry, Ohio State University, Columbus 10, Ohio.

The Ohio State University dental school will also sponsor its eighth annual post-college assembly April 23-24. Programs and reservation cards will be mailed directly to alumni. Graduates of other schools may obtain information by writing to the College of Dentistry, Ohio State University, Columbus, Ohio.

Southern California • The University of Southern California dental school is

offering a 15-month graduate course in orthodontics beginning June 23, under the direction of Spencer R. Atkinson, head of the department and professor of orthodontics.

The course, planned to meet the educational and experiential requirements of the Council on Dental Education of the American Board of Orthodontics, is designed to emphasize the basic principles and fundamentals relating to diagnosis and treatment, as well as to develop the clinical skill of each student to the highest level of his ability, the announcement states. Special consideration will be given to students wishing to prepare themselves for the teaching of orthodontics.

Tuition is $1,000; cost of instruments, supplies and textbooks is estimated at $293.50. The course is limited to 10 students, who must be graduates of approved dental schools. Applications must be received by March 1.

Further details may be obtained by writing to the dean, University of Southern California School of Dentistry, 122 East 16th Street, Los Angeles 15, Calif.

Tufts • The Tufts College dental school will continue to offer courses in Airbrasive Technic during the spring and summer, under the direction of J. Murray Gavel, assisted by Paul Vinton and Arthur Pearson.

An evening course is offered February 4-21; day courses, March 24-29 and at intervals during June, July and August. Tuition for the course is $200 and enrollment for each is limited to 14. Details may be obtained from the Division of Graduate and Postgraduate Studies, Tufts College Dental School, 136 Harrison Avenue, Boston 11.

DENTAL GRADUATES ELIGIBLE FOR RESEARCH FELLOWSHIPS

Ten fellowships offered through the graduate college of the University of Illinois will be awarded to qualified candidates interested in academic or research careers in the health sciences.

Dental graduates are eligible for stipends of $1,800 to $2,400 per calendar year and exemption from tuition fees. Applicants need not have completed clinical internships. Minimum requirements are bachelor and doctor of dental surgery degrees. Scholarship and promise of research ability will be primary considerations. Applications should be received by February 15; the first selections will be announced April 1, 1952. Forms may be obtained from the associate dean of the Graduate College, University of Illinois, 808 South Wood Street, Chicago.

Public Health

REPORT ACUTE SHORTAGE OF PUBLIC HEALTH DENTISTS

An inadequate supply of public health dentists is hampering local and state departments of public health, according to a report by William P. Shepard, member of the Health Resources Advisory Committee of the Office of Defense Mobilization.

In an address to the recent national convention of the American Public Health Association, Dr. Shepard disclosed the findings of a survey conducted by the committee last April. At that time, he said, 50 per cent of the dental positions in public health departments were vacant in an area covering six central states (Nebraska, Kansas, Iowa, North Dakota, South Dakota and Missouri).

Moreover, as of April, 1951, nearly one fourth (22 per cent) of dentists in public health departments were members of military reserve units, and 300 others

were covered by the "doctor draft" law and thus might be called for active military service.

WISCONSIN GROUP REPORTS RESULTS OF FLUORIDATION

Kindergarten pupils living on the west side of Madison, Wis., where the water supply has been fluoridated since 1948, have 48 per cent less dental decay than kindergarten pupils showed in 1947.

This and other findings of the Dane County Dental Society's Fluorine Committee were contained in a report published in the January issue of the *Journal of the Wisconsin State Dental Society.*

The teeth of 216 Madison-West children who have drunk fluoridated water during the last 3½ years were examined by the committee. Surfaces of the children's teeth were charted as to fillings and cavities. In addition to having 48 per cent fewer decayed teeth, more of the children examined had caries free teeth. About half (46.7 per cent) had never had a cavity; this was an improvement of 83 per cent over the percentage of caries free children in 1947.

The Fluorine Committee also compared the Madison-West children with 206 kindergarten pupils in Stevens Point, Wis., a fluorine free city. Stevens Point children had more than three times as much dental decay as the Madison pupils.

PUBLIC HEALTH SERVICE ANNOUNCES EXAMINATIONS

Dentists seeking appointments as dental officers in the regular commissioned corps of the United States Public Health Service may take competitive examinations April 1, 2, and 3. The examinations will be held in various cities throughout the country and will include written tests, a practical test, an oral interview and a physical examination.

Appointments—as assistant dental surgeon or senior assistant dental surgeon—are permanent and provide opportunities for careers in clinical research and public health. Completed applications must be in the agency's Washington office by February 26.

Application forms and additional information may be obtained by writing to: Surgeon General, United States Public Health Service, Federal Security Agency, Washington 25, D.C., Attention: Division of Commissioned Officers.

USPHS REDESIGNS PUBLIC HEALTH REPORTS

Edward G. McGavran, dean of the School of Public Health, University of North Carolina, has been appointed chairman of the board of editors of the new *Public Health Reports,* it has been announced by Leonard A. Scheele, surgeon general of the U. S. Public Health Service. Also named to serve on the board is John W. Knutson, chief of the agency's Division of Dental Public Health. The new *Public Health Reports,* issued for the first time in January, is an expanded version of the U. S. Public Health Service's 73-year-old journal of the same name.

CANCER RATE UNAFFECTED BY FLUORIDATION, SAYS USPHS

The prevalence and malignancy of cancer is unaffected by the consumption of water containing fluorides in the recommended amount, the U. S. Public Health Service has concluded from a study recently issued.

Using figures gathered in field studies of cancer prevalence during 1937-39, the bureau contrasted the incidence and malignancy of cancer in Denver, where the water supply contained 1.0 ppm of fluorides, with the cancer rate in San Francisco, where the water was essentially fluoride free.

National Defense

COMMISSION NAMED TO STUDY HEALTH NEEDS OF THE NATION

In a sudden presidential order which requires no Congressional approval, President Truman on December 29 created the President's Commission on the Health Needs of the Nation.

The 15-member commission has a single objective, he announced: "It will make a critical study of our total health requirements, both immediate and long term, and will recommend courses of action to meet these needs."

Ernest G. Sloman of San Francisco, president-elect of the American Association of Dental Schools, and Speaker, House of Delegates of the Association, represents dentistry on the new commission. In addition to Dr. Sloman, appointees included five physicians, one nurse, and eight authorities from the fields of education, labor, agriculture and private philanthropy.

Paul B. Magnuson, M. D., Chicago orthopedic surgeon and former medical director of the Veterans Administration, is chairman. Other physicians named to the commission were: Dean A. Clark, general director of the Massachusetts General Hospital, Boston; Evarts A. Graham, surgeon, St. Louis; Gunnar Gundersen, member of the Board of Trustees of the American Medical Association, La Crosse, Wis., and Russel V. Lee, associate clinical professor of the Stanford University medical school, San Francisco. Dr. Gundersen has since resigned.

In a statement accompanying the executive order, Mr. Truman urged the commission to give immediate attention to "subjects currently pending before Congress . . . such as aid to medical education and aid to local public health units." The order also authorizes and directs the commission to investigate emergency public health needs; the current and prospective supply of professional personnel; possible relocation of health personnel to new defense-production areas; the effect of military health demands upon existing facilities for public health, and "the adequacy of private and public programs designed to provide methods of financial medical care."

The commission is directed to submit its final report within one year, and to submit interim reports after conducting periodic public hearings.

GENERAL JAMES O. GILLESPIE JOINS FEDERAL COUNCIL

Brigadier General James O. Gillespie, Medical Corps, U. S. Army, has been appointed to the Armed Forces Medical Policy Council as senior army staff member. General Gillespie is best known as commanding officer of the army hospital at Bataan in the early phases of World War II. On the Council, he replaces Brigadier General Earle Standlee as chief of the Council's Planning Coordination Division.

CHIEF OF U. S. NAVY'S DENTAL DIVISION RETIRES

Rear Admiral Spry O. Claytor of the United States Navy Dental Corps retired January 1, after more than 34 years of continuous service. Admiral Claytor had been assistant chief of the Bureau of Medicine and Surgery for Dentistry, and chief of the Dental Division, since June 1950.

Rear Admiral A. W. Chandler, inspector general, Dental, USN, has been appointed, for additional duty, the interim chief of the Dental Division. He has been assigned the duties of that office tempo-

Spry O. Claytor
Rear Admiral, USN

A. W. Chandler
Rear Admiral, USN

rarily, to be relieved of them as soon as a permanent replacement for Admiral Claytor reports for duty.

Admiral Claytor entered the naval dental service in 1917, upon his graduation from George Washington University's dental school, Washington, D.C. He received decorations and citations in both World Wars and was appointed to the rank of Rear Admiral in 1948. Among his civilian honors are a fellowship of the American College of Dentists and membership in the International College of Dentists. Admiral Claytor will continue to live in Washington, D.C., but has no plans for entering private practice.

International

DENTISTS URGED TO REGISTER FOR INTERNATIONAL CONGRESS

A record number of American dentists is expected to attend the 11th International Dental Congress July 19-26 in London, according to E. Wilfred Fish of England, chairman of the organizing committee. Since heavy tourist traffic is expected next summer dentists from the United States have been urged to apply for membership in the Congress immediately.

The Fédération Dentaire Internationale, sponsor of the Congress, reports that fourteen United States dentists have already accepted assignments on international report panels. The scientific program of the Congress will be conducted from 8:30 a.m. to 5:30 p.m., from Monday, July 21, through Friday, July 25. The program will include international reports, table clinics, films and television, scientific exhibits and an oral hygiene exhibition.

Since English is one of the five official languages of the Congress, interpreters will translate all transactions into English.

The F.D.I. organizing committee has also announced a complete "Ladies' Programme" for wives of attending dentists, consisting of all-day tours, visits to museums and theaters, coach tours and a fashion show. Social events of the Congress will include evening receptions, banquets and the Congress Ball.

U. S. dentists who plan to attend the Congress are asked to send their names to Harold Hillenbrand, secretary of the Association, 222 East Superior Street, Chicago 11.

NAIR HOSPITAL DENTAL SCHOOL DEDICATES NEW BUILDING

Ceremonies opening the new building of the Nair Hospital Dental College of Bombay, India, will be held on February 6, with the Hon. Rajkumari Amrit Kaur, Minister for Health of the Republic of India, presiding.

The new four-story building is valued at Rs. 5,25,000 (approximately $110,-250), exclusive of equipment.

V. M. Desai, retiring dean of the dental school, will be honored at ceremonies dedicating the V. M. Desai Maxillo-Facial and Plastic Surgery Department. Dr. Desai was one of the founders of the school in 1933, its first dean, and an author of the Indian Dentists' Act of 1948. A graduate of Columbia University's dental school, he was elected president of the All India Dental Association in 1948, and is an honorary fellow of the Royal College of Surgeons of England and Edinburgh.

The new facilities of the dental school will enable 50 students to enter each year, instead of 30, as at present. Plans also call for the college to institute dental hygienist and dental technician courses, a dental research center, and a special children's clinic for preventive dentistry.

At the present time, the school has a student enrollment of 115, including 23 women students, and a faculty of 64 Indian graduates of American and European dental schools.

ALL INDIA DENTAL ASSOCIATION CONDUCTS CONFERENCE

The All India Dental Association convenes its seventh annual conference February 6 in Bombay. F. N. Mehta, organizing secretary of the four-day meeting, has arranged clinical and table demonstrations of operative, surgical, periodontic and prosthodontic dentistry. Refresher courses, chairside talks, new films and a symposium on periodontics are also scheduled.

Dr. Mehta also reports that the All India Dental Association will sponsor an oral hygiene exhibition to educate the general public and especially school children, during the week of February 9-15. At that time, the association will distribute prizes to students who have submitted the best oral hygiene posters.

AMERICAN DENTISTS ATTEND CONGRESS ON ODONTOLOGY

Among the 1,000 dentists who attended the third International Congress on Odontology in Santiago, Chile, in November were three representatives from the United States: Basil Bibby, director of the Eastman Dental Dispensary in Rochester, N. Y.; Leonard S. Fosdick, Northwestern University Dental School and president of the International Association for Dental Research, and Maury Massler of the University of Illinois College of Dentistry.

The congress was co-sponsored by the University of Chile, the University of Concepcion, and the Dentists' College of Chile. The Chilean government also subsidized in part the expenses of guest speakers.

CANADIAN DENTAL ASSOCIATION TO MEET JUNE 15-18

The Golden Jubilee Meeting of the Canadian Dental Association will be held June 15-18, in Vancouver, B. C. Communications regarding the meeting should be addressed to the Canadian Dental Association, 234 St. George St., Toronto 5, Ont. Hotel reservations should be requested directly from C. M. Whitworth, secretary of the convention committee, 218 Medical-Dental Bldg., Vancouver, B. C.

INCOME OF DENTISTS INCREASES IN CANADA

The 2,920 dentists in Canada earned an average income of $5,748 in 1949, according to a recent issue of the Canadian Dental Association's *Governors' Letter*. The average net income of dentists in the United States in 1949 was $7,037. The Canadian Department of National Revenue reports that in 1949, the average annual income of the dentist in Canada had increased $459 over his income in 1946. During the same three-year period, the annual income of the United States dentist had increased $721.

As an occupational group, Canadian dentists ranked fourth in annual income, below engineers and architects, lawyers, and physicians and surgeons.

General

WALTER HENRY WRIGHT, DENTAL EDUCATOR, DIES

Walter Henry Wright, dean and professor of prosthetic dentistry at the New York University dental school, died December 31 in New York, at the age of 58. Well-known for his research in the field of cleft palates, Dr. Wright was also an eminent educator and had contributed more than sixty papers on teaching and research to professional journals.

W. H. Wright

Dr. Wright was graduated from the University of Pittsburgh dental school in 1917, joined the faculty in 1918, and continued to teach there until 1946, when he became dean of the New York University dental school. He earned the degrees of bachelor of science, master of science and doctor of philosophy at his alma mater while on the staff.

Among the offices which he held are the chairmanship of the prosthetic section of the American Dental Association, and the presidency of the American College of Dentists, American Academy of Cleft Palate Prosthesis, National Society of Denture Prosthesis and Pan-American Odontological Association.

A veteran of World War I, he served during World War II as a dental consultant to the Surgeon General of the Army, an office which he held until his death. He was a member of the American Association of Dental Schools, International Association for Dental Research, the National Board of Dental Examiners, New York Academy of Dentistry, and (honorary) Academy of Dental Medicine. He is survived by his widow and a son.

WILLIAM GOUGET DIES; DENTAL SUPPLY FIRM OFFICER

William T. Gouget, for 60 years associated with the S. S. White Dental Manufacturing Company, died December 31 in Philadelphia, at the age of 77. Mr. Gouget was a member of the Board of Directors and former vice-president of the firm. A native of Chicago, he managed the company's office there from 1923 to 1930. He is survived by his widow, a son and a daughter.

R. M. DUNN, PAST PRESIDENT OF OKLAHOMA SOCIETY, DIES

R. M. Dunn of Tulsa, recent past president of the Oklahoma State Dental Association, died January 1 at the age of 56. At the time of his death, he was a member of the American Dental Association's Council on Insurance and was chairman of his state association's Health and Accident Insurance Committee. He was a foremost leader in establishing the state association's present group insurance plan.

President of his state association in 1949-50, Dr. Dunn had held district and state offices since 1925; he received a silver certificate of honor from the Oklahoma State Dental Association in 1944. He was graduated from Vanderbilt University dental school in 1919 and had practiced in Tulsa since that time. Surviving are his widow and two daughters.

ACADEMY OF DENTURE PROSTHETICS TO CONVENE

The Academy of Denture Prosthetics will hold its annual convention March 16-22 at the Hotel Roosevelt, New Orleans, La. Further information may be obtained by writing to the secretary-treasurer of the Academy, I. L. Furnas, 928 Silverado Street, La Jolla, Calif.

UNIVERSITY OF KANSAS CITY CITES GEORGE M. HOLLENBACK

The University of Kansas City selected as its man-of-the-year for 1951 George M. Hollenback, chairman of the department of research and professor of dental materials at the University of Southern California dental school.

An alumnus from the class of 1912, Dr. Hollenback was cited for his extensive research in the field of dental materials, including amalgam and materials used in inlay casting. In 1945, while earning his M.S.D. from Northwestern University, he established new values for the linear shrinkage of gold and its alloys.

ORTHODONTISTS ANNOUNCE APRIL MEETING

The American Association of Orthodontists will meet for its annual session at the Jefferson Hotel, St. Louis, April 21-24. Nonmembers of the Association will be classified and charged attendance fees accordingly at time of registration.

Further details may be obtained by writing to G. R. Moore, secretary, 919 Oakland Ave., Ann Arbor, Mich.

PENNSYLVANIA ALUMNI TO MEET NEW DENTAL DEAN

The midwinter meeting of the Dental Alumni Society, University of Pennsylvania, will be held on February 22, at the Penn Sheraton Hotel, Philadelphia. Lester W. Burket, newly appointed dean of the University's dental school, will address the meeting. Other speakers include Paul E. Bomberger, president of the Dental Alumni Society; I. S. Ravdin, vice-president in charge of medical affairs, and Arthur Corby, trustee, University of Pennsylvania.

Further information may be obtained from John P. Looby, The Thomas W. Evans Museum & Dental Institute, 4001 Spruce Street, University of Pennsylvania, Philadelphia 4.

SOUTHEASTERN SOCIETY OF ORAL SURGEONS TO MEET

The Southeastern Society of Oral Surgeons will hold its third annual meeting April 11-12 at the Hollywood Hotel in Hollywood, Fla. Details may be obtained by writing to George W. Matthews, editor of the Society, at 1922 10th Avenue South, Birmingham, Ala.

Current Literature

EFFECT OF TOPICALLY APPLIED ZINC CHLORIDE AND POTASSIUM FERROCYANIDE ON DENTAL CARIES EXPERIENCE

R. W. Anderson and J. W. Knutson. Pub. Health Rep. 66:33, August 17, 1951.

The study reported here was made to determine the caries preventive worth of zinc chloride and potassium ferrocyanide applied topically to the teeth of children according to the Gottlieb technic. In April and May 1949, zinc chloride and potassium ferrocyanide were topically applied to the teeth in half the mouth of each of 299 elementary grade school children of Chattanooga, Tenn. The children ranged in age from 7 to 15 years. In May 1950, approximately one year after treatment, the teeth of the children in the study group were re-examined.

The results indicate that under the conditions of this experiment the topical application of zinc chloride and potassium ferrocyanide to the teeth of children, according to the technic of Gottlieb, did not significantly reduce the vulnerability of the teeth to caries attack.

Heyl G. Tebo

MANAGEMENT OF ORAL-ANTRAL FISTULA

J. L. Jones. Ann. West. Med. & Surg. 5:7, July, 1951.

The author reviews the usual causes and treatments of oral-antral fistula as given by Blair and Ivy, Thoma, and Tholen. He also mentions the construction of a clear acrylic splint.

Heyl G. Tebo

FUNCTIONAL MALOCCLUSION IN ORTHODONTICS

Blair C. Madsen. Am. J. Orthodont. 37: 662, September, 1951.

The orthodontist of today is not solely interested in the satisfaction of the esthetic and cosmetic factors. The functional concept of occlusion to preserve masticatory efficiency and periodontal integrity as well as arch form is being stressed as well as the cosmetic factor.

It is estimated that 65 per cent of all people over 35 who lose their teeth lose them because of periodontal disease. Functional malocclusion is the chief cause of periodontal disease, temporomandibular dysfunction and destruction of arch form.

Many seemingly excellent completed orthodontic cases are predestined to failure because of failure to detect interferences existing on certain teeth, which alter the definite and powerful hinge axis closure of the mandible. In the normal function of closure there must be a positive correlation between two factors: namely, centric relation and centric occlusion. (Centric relation is defined as the relationship that exists between the condyle and the fossa when the mandible is in rest position. Centric occlusion is the relationship that exists between the cusps and fossae of the teeth when the teeth are closed.)

Approximately 45 per cent of orthodontic patients will reveal a conflict between these two factors, if a proper diagnosis is made. This conflict, which occurs during the hinge axis closure, is functional malocclusion, the greatest destructive force in the human mouth today.

The science of orthodontics can be further refined and its position enhanced in the eyes of the entire dental profession by the timely recognition and correction of this condition.

William F. Ford

JOURNAL OF DENTAL RESEARCH
October 1951

STUDIES IN THE REGENERATION AND REATTACHMENT OF SUPPORTING STRUCTURES OF THE TEETH. II. REGENERATION OF ALVEOLAR PROCESS

W. J. Linghorne and D. C. O'Connell, p. 604.

This paper reports a study of the factors concerned in the regeneration of the supporting structures of the teeth of dogs. A considerable degree of soft tissue reattachment to the tooth and regeneration of alveolar process was attained following the surgical removal of a section of alveolar process and periodontal membrane exposing the root of the tooth. The reparative process was studied at intervals varying from 12 to 120 days. The difference between osteoblasts and cementoblasts in the reparative process appears to be one position only. The factors concerned in the differentiation of these cells is discussed. The osteogenic effect of autogenous grafts of dentin and

bone are compared. Evidence regarding the fate of bone grafts is presented. A theory of the mechanism of repair of bone when grafts are used is advanced.

EFFECTS OF ACUTE FEBRILE DISEASES ON THE PERIODONTIUM OF RHESUS MONKEYS WITH REFERENCE TO POLIOMYELITIS

Sigurd Ramfjord, p. 615.

As part of an investigation of the relationship between systemic disease and periodontal state of health, 19 rhesus monkeys were inoculated with poliomyelitis virus. They developed acute poliomyelitis with high fever. Seven healthy monkeys were kept as controls. Clinical and histologic examination of the gingiva was performed before and during the experimental period. The animals were sacrificed when they reached the moribund stage and the periodontal tissues were examined together with specimens from temporomandibular joints, tibia and internal organs. The control animals were examined in the same way. No changes attributable to poliomyelitis were observed in the periodontium. Special connective tissue stains did not reveal any structural changes in the collagenous fibers in joints or periodontal tissues. An association was noted between accumulation of debris on the teeth and gingivitis. Gingivitis was observed more frequently and found to be more severe around deciduous than around permanent teeth.

LYMPHOCYTES IN THE EPITHELIUM OF THE HEALTHY GINGIVA

Martin Cattoni, p. 627.

Lymphocytes were found to be constantly present in the epithelium of the healthy gingiva of dog and man. In biopsy material these cells were found passing through the basal cell layer, entering into the intercellular spaces and pushing aside the cells of the first epithelial layer. In this position both lymphocytes and epithelial cells showed a physical distortion. When the lymphocytes pass this layer, their normal shape reappears. Few lymphocytes were found but their presence was constant in all of the specimens studied. Most of the lymphocytes were present in the basal layer and fewer in the prickle cell layer. The lymphocytes never reach the superficial part of the epithelium. The following changes were observed in the cytoplasm and nucleus of the lymphocytes. The cytoplasm became both wider and clearer while the nucleus stained more deeply. But in some cases this migration was accomplished with slight changes in cell area and morphology. No mitotic figures were observed among the lymphocytes. All were intercellular in position. The connective tissue underlying the epithelium showed no definite signs of injury. There was no indication of lymphocytes or plasma cell proliferation.

APPARATUS FOR EXAMINATION OF THE SO-CALLED ALVEOLO-DENTAL JOINT OF THE RAT

Eberhard Zwirner, p. 638.

A novel testing apparatus, using a high frequency recording process, records the displacements of rat's teeth by jerking movements and makes them visible, amplified several thousand times, on the screen of a cathode ray oscillograph. The characteristic curve graphs, obtained for the first time, may be evaluated as to power, time and distance and supply a series of numerical results.

BACTERIAL GROWTH AND CRYSTAL FORMATIONS. II. PRODUCTION OF CALCIUM CARBONATE CRYSTALS

Henry A. Bartels, p. 642.

The metabolic activities of microorganisms isolated from the oral cavity caused the formation of calcium carbonate crystals in an infusion agar medium containing 0.2 per cent to 0.5 per cent calcium chloride. In this way they might contribute to the formation of salivary calculus. This observation afforded further corroboration of the Naeslund theory of salivary calculus formation.

THE EFFECTIVENESS OF AN AMMONIUM ION TOOTHPOWDER IN THE CONTROL OF DENTAL CARIES

G. N. Davies and R. M. King, p. 645.

This experiment was designed to determine the effectiveness of a commercial ammonium ion dentifrice in controlling dental caries when the actual brushing procedure was not under rigid supervision. A total of 339 children and young adults in the age range of 12 to 31 years participated in the experiment. Of these, 171 were assigned to the experimental group and were issued a commercial ammoniated dentifrice containing 5 per cent dibasic ammonium phosphate and 3 per cent urea. The remaining 168 were assigned to the control group and issued a toothpowder containing the same ingredients except for the di-

basic ammonium phosphate and urea. Both groups were given identical instructions regarding the use of the powder. All participants were given a thorough clinical and roentgenographic examination at the beginning and end of the study period (March to November, 1950). Lactobacillus counts and Snyder tests were carried out. The experimental ammoniated toothpowder failed to reduce the annual increase in new caries when its effect was compared with that of a non-ammoniated powder used under the same conditions. The number of times per day that the powder was used made no apparent difference in this result. No significant difference due to sex or age was manifest in either control or experimental groups. There was no significant difference between the lactobacillus counts of the control or experimental groups at the beginning or end of the study period. In three subgroups the experimental powder produced a significant change in lactobacillus counts after the powder had been used for one month but this significant change was not manifest at the end of the experiment.

INFLUENCE OF AMMONIA AND OF UREA UPON L. ACIDOPHILUS 4646. II. STUDIES ON ANAEROBIC GLYCOLYSIS

Sholom Pearlman, p. 656.

Glycolysis of washed-cell suspensions of *Lactobacillus acidophilus* 4646 (recently reclassified as *Lactobacillus casei*) was studied by the Warburg technic, pH 7.4, temperature 38° C. Phosphate buffers depressed glycolytic activity in logarithmic proportion to their concentration. NH^+_4 was no more effective than K + phosphate. Urea 4 M inhibited the action completely; lesser concentrations of urea were less effective. Preincubation of washed cells with urea 4 M for 30 minutes reduced the subsequent glycolytic rate. No urease activity could be demonstrated in these cells by use of a modification of Conway's technic in which Warburg flasks served as diffusion vessels, alkali being added from the side-arm, and NH_3 diffused at 38° C. for 16 hours.

FREQUENCY OF ORAL MICROORGANISMS THAT INFLUENCE LACTOBACILLUS GROWTH IN VITRO

Charles A. Scrivener, Hugh I. Myers, Norman A. Moore and Ben W. Warner, p. 665.

Saliva samples were collected from 98 dental students immediately upon arising, utilizing the standard lactobacillus count technic. One-tenth cc. of a 1:1,000 and 1:10,000 dilution of the thoroughly shaken saliva was pour-plated in blood agar base medium. The plates were aerobically incubated 72 hours at 37° C. At this time the growth on these plates was covered with Kulp's tomato juice agar pH 6.1 heavily inoculated with Hadley lactobacillus (A.T.C. 4646). The plates were re-incubated aerobically at 37° C. for 96 hours. The plates were then examined on a Quebec colony counter. In some instances, a clear halo of complete inhibition of lactobacillus growth was observed over the saliva bacterial colonies. In others, there was a ring of larger lactobacillus colonies resembling satellitism. In a few cases, a zone of large lactobacillus colonies was observed at the periphery of the complete inhibition halo. All the types of colonies with complete inhibition halos that could be subcultured and representative types of the saliva colonies producing satellitism were established in pure culture, classified, tested for inhibition by cross-streaking with three lactobacillus types, and tested for saliva compatibility with the agar well technic. Twenty-five of the 98 salivas showed some complete inhibition. Of these, 24 also showed seeming satellitism. In all, 89 salivas showed this latter phenomenon, and only 8 showed neither phenomenon. The number of organisms, representing 18 or more species, showing these two phenomena, ranged from zero to 3,700,000 per cc. saliva. Of the 25 pure cultures tested by cross-streaking, 19 showed inhibition, but no evidence of satellitism or stimulation was found. Of the 25 pure cultures tested against 16 salivas tested with the well technic, 16 showed excellent compatibility and 4 poor compatibility. Five pure cultures gave insufficient growth for evaluation.

THE EVANSTON DENTAL CARIES STUDY. VII. THE EFFECT OF ARTIFICIALLY FLUORIDATED WATER ON DENTAL CARIES EXPERIENCE

I. N. Hill, J. Roy Blayney and Walter Wolf, p. 670.

Previous reports of the Evanston Dental Caries Study have indicated no reduction attributed to fluorine in the caries experience of the deciduous teeth of the 6, 7 and 8 year old children. This is thought to be due to the fact that all the deciduous teeth were developed and were present in the mouth for some time prior to the introduction of sodium fluoride in the communal water supply. The recent analysis of the data collected from the 12, 13 and 14 year old children indicates a reduction in the DMF permanent teeth of approximately

12.19 per cent. The precarious lesions of the permanent teeth were reduced by 55.7 per cent for the 12 year olds, 38.8 per cent for the 13 years olds and 33.3 per cent for the 14 year olds. The total number of children examined (1,769) for this age group indicated a 73.21 per cent increase of those who are immune to dental caries as shown clinically and roentgenographically.

THE EVANSTON DENTAL CARIES STUDY. VIII. FLUORINE CONTENT OF VEGETABLES COOKED IN FLUORINE CONTAINING WATERS

Donald J. Martin, p. 676.

Fresh and frozen vegetables cooked in fluoride containing waters, absorbed and retained some of the fluoride from the cooking water. Vegetables cooked in a saucepan absorbed more fluoride than those cooked in a pressure cooker.

A SELECTIVE MEDIUM FOR THE ISOLATION AND ENUMERATION OF ORAL LACTOBACILLI

Morrison Rogosa, Joyce A. Mitchell and Ralph F. Wiseman, p. 682.

A new, easily prepared, inexpensive and reproducible medium is presented for the selective isolation and enumeration of oral lactobacilli from human and animal samples. In the comparative study of 122 human salivary specimens and 156 oral hamster samples in the new SL agar and on the modified Hadley TJ agar, it was found that SL agar was almost completely specific for lactobacilli and produced counts which compared favorably with those obtained from TJ agar. Except for the infrequent presence of yeasts in greatly reduced numbers, all of the organisms other than lactobacilli found on TJ agar, such as micrococci or staphylococci, streptococci, molds, spore-forming bacteria and gram-negative rods, are eliminated in SL agar.

A HISTOLOGICAL STUDY OF THE EFFECT OF EARLY PHASES OF CARIES ON THE ORGANIC COMPONENT OF THE ENAMEL OF THE SYRIAN HAMSTER

James Nuckolls, Barbara Killian and Harry E. Frisbie, p. 690.

A histological study of the organic matrix of the enamel and dentin of a limited number of the teeth of the Syrian hamster indicates that the early phases of the disease of caries may be associated with the early breakdown of the organic component of the structure. In this respect caries in the hamster seems to be similar to that in the human being. This mechanism includes the presence of organisms in the plaque, the breakdown of the organic cuticle followed by the invasion of coccoidal organisms into specific tracts in the enamel and along the lateral walls of the dentinal tubules. This early phase of caries of the lamellae precedes the formation of open cavities, is microscopic in nature and can be observed only by histological methods.

It is postulated that the early extension of the disease process is concerned with an enzymatic breakdown of the organic matrix together with the presence of an acid which would produce a demineralization of the apatite lattice of the enamel.

ARTIFICIAL DENTAL CARIES

F. C. Besic, p. 708.

Three extracted bicuspids from three different patients with varying degrees of caries experience were used to demonstrate five characteristics of true early clinical caries. These characteristics are: (1) normal surface contour and gloss exhibiting an opacity when dry; (2) pigmentation of the affected areas: (3) rarefaction extending through the enamel as shown roentgenographically; (4) softening of the enamel and (5) spreading of the process at the dentinoenamel junction.

The artificial lesions were produced by incubating (for six months) the specimens in Brewer's medium containing bacto-dextrose and contaminated saliva (mixed flora).

HISTOLOGICAL FINDINGS IN THE SALIVARY GLANDS OF THE RAT FOLLOWING SODIUM FLUORIDE ADMINISTRATION

Alfred L. Ogilvie, p. 712.

Although the salivary glands are known to be a pathway of fluoride excretion there are no references to specific fluoride-produced change in these structures. An experiment was conducted involving the intraperitoneal administration of sodium fluoride to 20 rats, and the subsequent study of their parotid, submaxillary and sublingual glands. Definite modifications were observed in the alveolar cells of both parotid and submaxillary glands. In the submaxillary alveolar cells there were changes in the proportionate number of one type of cell to another, enlargement of nuclei, staining irregularity and vacuolation of the cytoplasm. The same cytoplasmic and nuclear

changes, as well as an increased mitotic division, were found in the alveolar cells of the parotid gland. The sublingual gland remained unaltered. It is evident that serous cells of both parotid and submaxillary glands in the rat are specifically affected by the fluoride ion.

RADIOIODINE PENETRATION THROUGH INTACT ENAMEL WITH UPTAKE BY BLOODSTREAM AND THYROID GLAND

Herbert J. Bartelstone, p. 728.

Evidence, *in vivo*, of enamel permeability in a centripetal direction is presented using the following experimental arrangement: the cuspid (*in situ*) of a cat is dipped into 0.5 cc. of a solution containing 1 mc. of I^{131} per cc. so that only about 4 mm. of the tip of the intact enamel cusp is wet by the solution. Significant counts over background counts were read from a Geiger counter placed over the thyroid gland in all 8 experimental animals. This established the existence of mechanisms which permit a tissue fluid solute, such as I^{131}, to pass through intact enamel, dentin, and into the bloodstream, with concentration in the thyroid gland. Radioautographs of the teeth and periodontium disclosed a diffuse penetration of the I^{131} through the tooth, periodontal membrane, alveolar bone and gingiva. Controls demonstrated the fact that the sole contact of the cat with the I^{131} is the source external to the intact enamel surface. The possibilities for altering the internal environment of the teeth and periodontium of adult cats have been shown. The degree to which this may influence the progress of caries and periodontal disease remains to be determined.

CORRELATION OF HYPERCEMENTOSIS WITH TOXIC GOITER: A PRELIMINARY REPORT

I. J. Kupfer, p. 734.

A dental survey of 36 white women with toxic goiter was made to determine a relationship between hypercementosis and toxic goiter.

Two control groups of the same identical age, sex and color distribution were used, one a hospital control group and the other a control group selected from the population at large.

Roentgenographic results indicated that 80 per cent of the patients in the group with toxic goiter had evidence of hypercementosis as compared to 19 per cent in each of the two control groups.

THE INFLUENCE OF ROTATIONAL SPEED ON TEMPERATURE RISE DURING CAVITY PREPARATION

R. C. Vaughn and F. A. Peyton, p. 737.

This is a report of an investigation of the temperature rise which occurs from cutting tooth tissue with steel burs and tungsten carbide burs when operated at speeds up to 11,000 rpm. Values from only the fissure type burs are reported. Operating pressures of from one-half to two pounds were employed in the tests. Conventional dental equipment was used in this study for cutting extracted teeth. The temperature change was measured in the tooth at various distances from the bur and in the area immediately adjacent to the bur. Graphs of the temperature change as a function of speed and pressure are presented. In this study it was observed that the maximum temperature was reached within a few seconds from the start of the cutting operation when intermittent pressure was used. The maximum temperature of 160° F. was observed when operating at 11,000 rpm and two pounds pressure.

THE EFFECT OF SECTION SIZE ON THE MECHANICAL PROPERTIES OF WROUGHT GOLD WIRES

S. H. Bush and F. A. Peyton, p. 745.

Three dental golds, varying widely in chemical composition and in microstructure, were selected to determine the effect of section size on the mechanical properties of these wires. Four section sizes, 20 gage (0.030 inch), 18 gage (0.040 inch), 16 gage (0.050 inch), and 14 gage (0.064 inch), were investigated. These wires were tested both in bending and in tension, using the proportional limits as a criterion for comparison. The wires were tested in the softened and the hardened state. One wire was also tested after heating 1,700° to 1,800° F. (927° to 982° C.) for one hour to determine the effect of grain size on the mechanical properties. No definite correlation was observed between section size, as such, and proportional limit. Results indicated that grain size and, possibly, chemical composition were the important factors. On comparing the proportional limits of the alloys as a function of section size it was observed that the values varied to the same extent in both the softened and hardened state. Both bend and tensile tests proved to be equally satisfactory when used as a medium of comparison between section size and proportional limit.

Book Reviews

RESEARCHES ON THE RADIOTHERAPY OF ORAL CANCER

By C. A. P. Wood and J. W. Boag. Special report No. 267 of the Medical Research Council. 148 pages with 75 illustrations. Price $1.75. London, England, His Majesty's Stationery Office, 1950.

The senior author of this excellent report ranks among the best practitioners, outstanding observers and honest reporters of therapeutic radiology. Dr. Wood has devoted years of scientific endeavor to the rationalization of roentgen therapy and curietherapy in order to facilitate teaching, to improve technics and to raise the proportion of successful results. Such an attempt implies of necessity an effort to control dosage, to observe the different radiophysiologic responses to the same physical influence and the statistical evaluation of results. The present report emphasizes these three important basic disciplines; physics, radiobiology and statistics.

The first part of the report is concerned with an experimental comparison of roentgen rays and radium rays. It contains a description of an ingenious dose-contour-finder by P. Howard-Flanders. The skin reaction appeared to develop more rapidly and to be more severe under the influence of roentgen rays than of radium rays. Assessment of differences in tumor response was not possible. Differences in wavelength of radiations employed did not influence the clinical results.

The second part is concerned with histological investigations by A. Glucksmann and F. G. Spear to determine the relative effects of radiations on the different tumors and to attempt to establish a prognosis.

The third chapter is devoted to the statistical analysis of results. A new statistical method is proposed for the estimation of final success from the interim clinical results; this method of "maximum likelihood," evolved mostly by J. W. Boag, the junior author of the report, groups the patients into (1) those dead from cancer at the time of analysis, (2) those dead from intercurrent disease rather than from the cancer, (3) those alive and symptom-free and (4) those alive but with recurrent or persistent cancer.

Cancer in its different locations, even within the upper air passages, has a great variety of manifestations, not necessarily morphologic, the knowledge of which is as important to the successful treatment as are the physical calculations of dosage. Final results in the treatment of histologically analogous tumors are considerably more dependent on the ability with which the treatment is administered, or upon the possibility or impossibility of administering the minimum necessary dose to the entire tumor area, than on morphologic variations. Statistical evaluation of results in the presence of physical, pathologic and radiobiologic variants, in addition to human error, becomes almost futile, for these factors cannot be properly adapted to mathematical exigency. Change of a member of the staff of a therapeutic institution may more effectively increase the proportion of good results than any other single means. Praiseworthy as the authors' efforts unquestionably are, they have not succeeded in appreciably improving on the results of less scientific but not less skillful predecessors and contemporaries.

J. A. del Regato

NITROUS OXIDE-OXYGEN ANESTHESIA

By F. W. Clement, M.D. Third edition. 369 pages with 129 illustrations. Index. Price $6.50. Philadelphia, Lea & Febiger, 1951.

Earlier editions of this book dealt largely with the methods devised and taught by the late Dr. E. I. McKesson. "However, no one in medicine has ever devised a technique which is absolutely final. As our knowledge grows, our methods alter accordingly. And so, in the fifteen years since McKesson's decease, our increased knowledge of physiological processes has led to the modification of much of his original teaching and methods. For example, the theory of anesthesia by oxygen exclusion is no longer held; drastic secondary saturation methods are not employed; new and better synergists are now available to simplify the control of anesthesia, and the problem of muscle relaxation has been solved by the introduction of curare.

"When one considers the value of nitrous oxide as an anesthetic we have as one extreme —McKesson, who felt that nitrous oxide could and should be employed for each and every operation; as the other extreme—those who insist that its administration is fraught with so much danger that its use should be aban-

doned. As usual, there is always a safe middle ground—to which the author and his associates are committed.

"During the past two decades there have been great advances in the field of anesthesia. These are—(1) the introduction of the endotracheal catheter, (2) the carbon dioxide absorption method, (3) the intravenous barbiturates, and (4) last but not the least, curare. The use of the active principle of curare has proven a great boon to the surgeon, patient, and anesthetist. It has simplified the use of the majority of our anesthetic agents and extended their field of usefulness. It has radically altered the method of administration of nitrous oxide for intra-abdominal operations by supplying the factor—heretofore missing—namely lack of potency in producing muscular relaxation."

The text of this edition has been enlarged and contains 80 more pages and 37 more illustrations than does the second edition. The properties of nitrous oxide and its physiologic effect when given to produce general anesthesia, either by itself or with the various adjuncts, is clearly described. The effectiveness of continuous and of intermittent flow machines designed for the administration of nitrous oxide-oxygen anesthesia, is reviewed critically. The methods of administering nitrous oxide-oxygen anesthesia are described, as well as the use of various adjuncts. Considerable space is given to methods of placing the tube for endotracheal anesthesia. There is a chapter which discusses common misconceptions of the use of nitrous oxide-oxygen anesthesia. Part 5 of the book deals with dental anesthesia and analgesia. In this, the third edition of his book, Dr. Clement presents a straightforward discussion of the place nitrous oxide-oxygen holds in modern anesthesia.

Warren R. Schram

LABORATORY MANUAL OF ELEMENTARY ORGANIC CHEMISTRY

By George Holmes Richter. Second edition. 146 pages with 12 figures. Index. Price $1.80. New York, John Wiley & Sons, Inc., 1951.

As the author states in his preface, this laboratory manual was written with the object in mind of arousing the interest of students of the biological sciences in the methods of organic chemistry. In spite of this purpose, however, the laboratory exercises can be used for any beginning organic chemistry course, no matter what its scope. The 49 experiments chosen show good selection and very difficult experiments are not included.

An attractive feature of this manual is the casual manner in which Professor Richter discusses briefly in each exercise the type of reaction to be studied and the properties and uses of the chemicals to be synthesized. Rather than separate these discussions from the procedure directions to be followed in the experiments, the author blends this additional information into the procedure itself.

The introduction should be read by both student and instructor alike. Careful study of this section should alert the student to the dangers inherent in organic chemicals, point out the observations which should be made during each exercise, and demonstrate how knowledge which should have been acquired from general chemistry can be used and expanded in the study of organic chemistry.

Following the introduction there is an experiment on the qualitative tests for the elements and a series of four experiments illustrating a few methods of purification. The remaining exercises follow the usual pattern with the more difficult experiments occurring toward the end of the manual.

While the main body of the text leaves little to be desired, the manual could be improved by introducing questions at the conclusion of all the experiments instead of after some, as is the case. Also, if in addition to the excellent list of materials required for the exercises, a table showing the approximate time required to perform an experiment were included, the task of the instructor in scheduling experiments in accordance with the time available would be greatly lessened.

Vincent J. Sawinski

DIE ARBEITSPHYSIOLOGIE DES MENSCHLICHEN KAUORGANES (THE WORKING PHYSIOLOGY OF THE HUMAN MASTICATORY ORGAN)

By Carl Hiltebrandt. 144 pages with 20 illustrations. Bad Woerishofen, Germany, Edmund Banaschewski, 1950.

This book is a curious mixture of facts and fancy. The holistic view of the components of the masticatory system is, unfortunately, obscured by the author's adherence to the peculiarly mystic, almost panpsychic or panintellectual philosophy of R. H. Francé. "Everything organic has as basic quality the faculty of judgment (Urteils-Kraft) that regulates ultimately all functional events. Without this organic teleology, that is a psychic quality of the living matter, the creation of form by function would be understandable. . . . Therefore the physiology of the masticatory

organ cannot be interpreted as the sum of the functions of its single parts. The concerted play of all functions is directed by a higher intelligence that, as a quality of integration, is inherent in the masticatory organ and represents a function superior to its parts." Despite such flights into the realms of fantasy, the book contains many good observations. But these are mixed again with untenable remarks—for instance, the important function, but the practical insignificance, of the articular eminence; the differences in lateral movement in herbivores, apes and man; or the mechanical differences of upper and lower teeth. Almost humorous is the theory that by the invention of fire as a means for roasting meat, enabling man to utilize its higher nutritional value "man saved time in which he could busy himself with the improvement of his mode of life, that is, he could now stimulate the activity of his brain. . . ." It is the opinion of the reviewer that only those persons should read this book who are capable of critically evaluating its contents. They, but only they, may find much that is worth while.

Harry Sicher

AN INTRODUCTION TO THE STUDY OF VIRUSES

By Kenneth M. Smith, F.R.S. 106 pages with 16 plates. Bibliography. Index. Price $2.50. New York, Pitman Publishing Corp., 1950.

This represents an attempt to survey the entire field of viruses within one text.

A review of the early incidence of virus diseases among mankind is offered in the introductory chapter. Succeeding chapters cover intensively the natural and artificial modes of transmission and spread of viruses. Considerable space is devoted to a study of the fascinating and little understood interrelationship of the viruses to insects and other arthropods which transmit them. Short descriptions are given of symptomatically representative plant and animal virus diseases, and various means of isolation and purification are discussed. Succeeding chapters reveal the value of the electron microscope in studies in this field and various physical and chemical properties of the viruses are noted. The closing pages of the book deal interestingly with virus serology and virus disease control.

This book covers a diverse and fertile field and can be easily read. The common characteristics of these heterogeneous organisms are clearly conveyed to the reader. The extensive bibliography and index constitute a handy means of ready reference. The excellent plates reveal gross and photomicrograph views of viruses and their actions.

This is an authoritative treatise on viruses and should prove valuable to the research worker in this and allied fields, to the student, and to anyone with an interest in the subject.

Morton Heide

CHRONIC ILLNESS (DIGESTS OF SELECTED REFERENCES)

By Violet B. Turner. Public Health Bibliography Series No. 1, Federal Security Agency, Public Health Service. 216 pages. Index. Price $0.50. Washington, D. C., Government Printing Office, 1951.

Dublin has pointed out that "efforts in control of infections during the past 50 years plus falling birth rates and restriction of immigration have resulted in a higher proportion of aged in our population and consequent concentration of major illnesses and invalidism at an older age level."

This compilation provides fairly comprehensive digests of articles, books and pamphlets that present information on various types of chronic illnesses, or which stress needs, experiences or recommendations applicable to more than one type of chronic illness.

The contents are subdivided under the following headings: "Dimensions of the Problem," "Contributory Factors," "Institutional Care," "Noninstitutional Services," "Rehabilitation," "State and Local Approaches to the Problem."

J. M. Wisan

KNOW YOUR TEETH

By Walter Neal Gallagher, D.D.S. 81 pages with index and 2 illustrations. Price $2. New York, Exposition Press, Inc., 1950.

By the simple yet efficient method of question and answer the author offers a guide for the layman on the care of the teeth and the oral cavity.

The preface contains a brief review of the history of dentistry followed by plates showing the deciduous and permanent dentition. The bulk of the text contains the questions about teeth most frequently asked by dental patients, and their answers. Unfortunately these appear in no particular sequence. How-

ever, a comprehensive index obviates any difficulty in checking any particular branch of the field.

As an elementary reference text for the patient, this book achieves the intended purpose, provided, as the author notes, it does not serve as a substitute for the services of the family dentist.

The usual didactic questions, familiar to members of the profession, are covered. The book also includes a discussion of the newer advances in the field; namely, the ammoniated dentifrices. Unfortunately, an occasional misconception popular among the laity is repeated. This reviewer has in mind the frequently asked question about the age at which orthodontic treatment should begin. No definite age can be given because calendar age may vary from developmental age in individuals. The type of malocclusion may be quite different. The wise suggestion is made by the author that an orthodontist be consulted at the first sign of tooth irregularity.

This book can be used best by members of the dental profession in the waiting room. Here it may stimulate the patient toward more interest in care of the teeth and the mouth.

Morton Heide

HANDBOOK OF BIOLINGUISTICS—
PART ONE—SECTION A

By Clarence L. Meader, Ph.D., and John H. Muyskens, Sc.D., L.H.D. 330 pages with 107 illustrations. Index. Price $10. Toledo, Herbert C. Weller, 1950.

Biolinguistics, as Meader and Muyskens designate their science, is the study of speech as biological phenomena. Their book, *Handbook of Biolinguistics,* takes the point of view that speech is one of the human functions rooted deep in the anatomy, physiology and development of the individual and the species. It contradicts the older viewpoint that speech is a more or less artificial function, purely mental in nature, imposed on organs designed for other functions such as mastication and respiration. The authors consider that speech is a fundamental urge based on the entire physical, emotional and mental being.

Since the authors have been associated in language studies for more than 30 years, their *Handbook of Biolinguistics* reflects their extensive training and experience in foreign languages, linguistics, anatomy, physiology, psychology, phonetics and speech.

This volume of 330 pages, concerned with the anatomy and physiology of normal speech and limited to "the structures and processes of expression," is only a small fragment of the series designed to present an exhaustive study of the entire biolinguistic field. It begins with a general introduction to biolinguistics, tracing briefly the historical development of speech studies and setting forth the four approaches to modern linguistic study; namely, comparative philology, psychology of language, phonetics and speech pathology and biolinguistics.

The section covering Chapters 4 to 9 deals with the processes of the body, mostly vegetative, from which speech arises. The "emergence" of speech, the factors which determine it, and the basic characteristic stages in which it develops are told in the last four chapters (10 through 13). It would be impossible in this short review to give an adequate idea of the theme set forth by the authors, but some inkling of the progress which they have made in this volume may be gained from the following excerpt:

"Speech develops in five stages: *melody, rhythm, accent, vowel and consonant.* Each consists of a series of organismal and extra-organismal processes, to wit: (a) physico-chemical processes in the tissues of the speaker, (b) movement of those tissues (active and passive), (c) air vibrations (waves), (d) physico-chemical processes in the listener, (e) subjective experience (thought and feeling) in both speaker and listener. Each of these five (a-e) has passed through a long evolution in the phylogenetic series and still recapitulates that evolution in the life-history of each individual. This period of evolution has in each case resulted in complicated end-products which bear little resemblance to their primitive, simple, earliest discoverable forms."

As to the particular relevance of the book to the interests of various readers concerned with problems of speech, the concluding paragraph of Dr. Leon H. Strong's Foreword will serve:

"The scope and scholarship of the book is comprehensive. Certain crafts essentially based on biological phenomena, those of Medicine and Dentistry, may profit by gaining the point of view toward speech and its disorders put forth in this book. Since the essence of the book is speech, the public speaker, the broadcaster and especially the singer may enrich their several capacities in precision entertainment, by working in accord with the principles here laid down. This is the first comprehensive book of its kind. It deserves the widest reading by the speech conscious public. The book lays the foundation for a branch of Science."

Fern Billingsley Denton

A TEXTBOOK OF X-RAY DIAGNOSIS (VOLUME 1)

Edited by S. Cochrane Shanks, M.D., and Peter Kerley, M.D., D.M.R.E. Second edition. 434 pages with illustrations. Index. Price $12. Philadelphia, W. B. Saunders Co., 1951.

This textbook by British authors is divided into four volumes. The first volume deals entirely with the roentgenographic diagnosis of the head and neck. Included in Part 2 of this volume is the roentgenographic diagnosis of the teeth and jaws.

The text is well-written in understandable language, but the chances are it will not be of particular use in the average dental office. Of the 434 pages, only 57 are devoted to dental maladies and the diagnosis of these conditions receives the barest possible discussion. No mention is made in this section of roentgenographic technic whereas in other parts at least 10 to 30 pages are spent on technics used to produce the roentgenographic images.

The terminology frequently differs from the standard terminology used in this country, consequently some discrepancies may be encountered in diagnosis of a particular lesion.

Sam W. Williams

THE INITIAL TISSUE REACTION INCIDENT TO ORTHODONTIC TOOTH MOVEMENT

By Kaare Reitan. First edition. 240 pages with 134 illustrations. Paper. Price $3. Oslo, Norway, P. A. Norstedt & Söner, 1951.

In this monograph the effects of the application of forces by both fixed and removable appliances and on both functioning and nonfunctioning teeth are described and discussed. The period covered by this investigation is brief and is limited to the first reactions of the supporting tissues. Such changes were found only after at least 36 hours and in only a limited number of instances; more frequently they appeared after 48 hours of experimentation, and in some cases not until about the sixtieth hour. The results observed in these experiments indicate that time is a much more important factor than the amount of force used. In young animals, the reaction is apt to appear earlier than in older subjects, although in young dogs in the period of active growth, it is difficult to draw a sharp line between growth changes and the changes resulting from the forces applied to the teeth. The changes noted are bone resorption, bone apposition, cell proliferation and some minor and relatively insignificant circulatory alterations.

In all, 34 dogs were used and specimens were supplied from the mouths of 23 young patients; 147 teeth were included in the experiments. The experimental methods are described in some detail, especially the technic and methods of applying the forces to the teeth and the removal of the blocks of tissue from the human subjects. The material removed for histological examination was promptly and adequately fixed and carefully sectioned as is evident from the excellent illustrations. It is not surprising that little vascular change is noted because of the short duration of the experiments and the tendency of changes, largely functional, to disappear before removal and fixation can be accomplished. This monograph is of interest only to the oral pathologist and the experimenters in the field of orthodontics. In these areas careful study of this material is indicated as it affords a substantial foundation for the analysis of previous experimentation and for further experimentation covering longer periods of force application.

Edward H. Hatton

Deaths

Adamson, John, South St. Paul; Dental School, Northwestern University, 1905; died October 20.

Agris, Jacob, Brooklyn; New York College of Dentistry, 1924; died November 25; aged 50.

Alderson, Charles M., Los Angeles; College of Dentistry, University of Southern California, 1908; died November 22.

Axelband, Abraham, Brooklyn; College of Dental and Oral Surgery, New York, 1918; died February 13, 1951; aged 54.

Bellows, John M., Maynard, Mass.; died November 16; aged 81.

Bower, Leroy R., Chadron, Neb.; Dental School, Northwestern University, 1905; died October 13.

Brodsky, Leon J., Washington, D. C.; Imperial University of St. Vladimir, Kiev, Russia, 1896; died November 19; aged 78.

Brown, Walter F., Norridgewock, Maine; died May 1; aged 85.

Brunk, Lewis P., Lima, Ohio; College of Dentistry, Ohio State University, 1919; died May 24; aged 55.

Burgess, John R., Missoula, Mont.; Kansas City Dental College, 1916; died October 24; aged 58.

Burnstone, Michael, Brooklyn; College of Dentistry, New York University, 1919; died April 30.

Capron, Fred M., Akron, Ohio; College of Dental Surgery, University of Michigan, 1902; died October 18; aged 70.

Clapp, Fred C., Grand Rapids, Mich.; School of Dentistry, University of Michigan, 1895; died November 16; aged 78.

Clark, Charles E., Aliquippa, Pa.; School of Dentistry, University of Denver, 1901; died November 1; aged 76.

Clawson, Marion D., Nashville, Tenn.; School of Dentistry, St. Louis University, 1926; died December 17; aged 51.

Cunningham, Arthur J., Warrensburg, N. Y.; School of Dentistry, University of Pennsylvania, 1913; died November 11; aged 61.

Curtis, Edward C., Seattle; College of Dental Surgery, University of Michigan, 1901; died October 30; aged 71.

Daingerfield, Charles L., Santa Cruz, Calif.; College of Dentistry, University of California, 1912; died November 19.

Dolson, George C. W., Ladd, Ill.; Chicago College of Dental Surgery, Loyola University, 1913; died November 16.

Duncan, Clarence A., Atlanta, Ga.; Atlanta Dental College, 1915; died November 14; aged 62.

Edmiston, Horace S., Shaker Heights, Ohio; School of Dentistry, Western Reserve University, 1917; died October 18; aged 60.

Elzer, Alexander D., Beverly Hills, Calif.; College of Dentistry, University of Southern California, 1926; died November 6; aged 47.

Evans, Nolly S., Augusta, Ga.; Atlanta Dental College, 1904; died May 11; aged 68.

Fackiner, Carl J., Cambridge, Ohio; College of Dentistry, Ohio Medical University, 1903; died October 19; aged 71.

Farrell, Stanley M., Ellensburg, Wash.; died November 5; aged 57.

Farrier, Rufus S., Clarksville, Texas; College of Dentistry, University of Illinois, 1910; died November 12.

Gaffney, Edward M., Charleston, S. C.; Atlanta-Southern Dental College, 1915; died October 30; aged 65.

Gardner, Daniel S., Sr., Scranton, Pa.; School of Dentistry, University of Pennsylvania, 1902; died November 15; aged 74.

Garrison, Harry C., Houston, Texas; Texas Dental College, Houston, 1930; died October 21; aged 46.

Gass, Charles M., Sunbury, Pa.; Pennsylvania College of Dental Surgery, 1900; died November 3.

Gigray, William F., Caldwell, Idaho; College of Dentistry, University of Iowa; 1909; died November 2; aged 65.

Gill, Charles L., Bellevue, Neb.; died November 8.

Ginsburg, David, New Rochelle, N. Y.; New York College of Dentistry, 1914; died November 12; aged 62.

Gould, Arthur D., San Diego; School of Dentistry, University of Buffalo, 1895; died October 29; aged 80.

Graham, Roy F.; Oklahoma City; Marion-Sims Dental College; St. Louis, 1902; died November 9; aged 75.

Greene, Carroll H., Norfolk, Va.; Dental Department, Baltimore Medical College, 1909; died November 6; aged 67.

Gresham, John L., La Crescenta, Calif.; College of Dentistry, University of Southern California, 1905; died November 16; aged 70.

Groff, Harold K., Lancaster, Pa.; School of Dentistry, Temple University, 1927; died November 4; aged 45.

Gwinn, William M., Menlo Park, Calif.; died November 26.

Hall, James A., Shamrock, Texas; Birmingham Dental College, 1904; died October 20; aged 69.

Hansen, Christian F., Fremont, Neb.; died October 26.

Harris, John W., Morris, Minn.; died November 10; aged 92.

Heacock, William R., Redlands, Calif.; College of Physicians and Surgeons, San Francisco, 1899; died October 28; aged 83.

Hilliard, George S., Whiting, Ind.; Dental School, Northwestern University, 1896; died November 9; aged 81.

Hirschman, Morris, New York; College of Dentistry, New York University, 1908; died December 1.

Janett, John A., Fountain City, Wis.; Chicago College of Dental Surgery, Loyola University, 1900; died November 9; aged 76.

Jones, Allan L., Stoneham, Mass.; died November 20.

Klein, Ernest F., Denver; Lincoln Dental College of Cotner University, 1916; died November 1; aged 59.

Lewis, George H., Newton, Kan.; Kansas City Dental College, 1918; died October 25; aged 60.

Light, Ralph E., Montgomery, Mich.; Chicago College of Dental Surgery, Loyola University, 1916; died October 15; aged 59.

Logue, Harry O., East Chatham, N. Y.; New York College of Dentistry, 1894; died October 28; aged 78.

Love, Dorrance T. Manson, Iowa; Dental School, Northwestern University, 1904; died October 30; aged 70.

MacDonald, James G., Haddonfield, N. J.; School of Dentistry, University of Pennsylvania, 1905; died November 6; aged 70.

Marshall, Pope L., Columbus, Ohio; College of Dentistry, Ohio State University, 1904; died November 15; aged 60.

Martin, Joseph B., Syracuse, N. Y.; died November 4.

Matz, Borris B., Newark, N. J.; Medico-Chirurgical College of Philadelphia, 1908; died December 7; aged 70.

McCormick, Arthur C., Xenia, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1900; died November 19; aged 79.

McCroba, Burton, Lima, Ohio; College of Dentistry, Ohio State University, 1917; died October 26; aged 61.

McGrane, Henry F., Chicago; College of Dentistry, Creighton University, 1914; died October 27; aged 64.

Miller, Donald H., San Leandro, Calif.; College of Physicians and Surgeons, San Francisco, 1933; died November 16; aged 49.

Morrow, Welby S., Kearney, Neb.; Western Dental College, Kansas City, 1896; died November 1; aged 82.

Moxley, William E., Eugene, Ore.; College of Dentistry, University of Iowa; 1909; died October 28; aged 66.

Newhall, Frederick A., Lorain, Ohio; School of Dentistry, Western Reserve University, 1914; died November 13; aged 60.

Norton, Arthur J., Saugerties, N. Y.; Pennsylvania College of Dental Surgery, 1897; died November 1.

Parker, Reuben W., Avon Lake, Ohio; School of Dentistry, Western Reserve University, 1897; died October 6; aged 80.

Petrey, Clarence S., Alexander City, Ala.; Atlanta-Southern Dental College, 1908; died October 6.

Pfaadt, Roy G., Cambridge, Ohio; Department of Dentistry, Starling-Ohio Medical College, 1913; died May 30; aged 60.

Phillips, William C., Chicago; Chicago College of Dental Surgery, Loyola University, 1913; died October 26; aged 63.

Pierce, William C., Milwaukee; Dental Department, Milwaukee Medical College, 1897; died November 8; aged 75.

Powell, William D., Fort Smith, Ark.; Kansas City-Western Dental College, 1922; died October 30; aged 53.

Purdy, Percival A., Seattle; Philadelphia Dental College, 1890; died October 17; aged 88.

Rathburn, Carlisle B., Syracuse, N. Y.; College of Dental Surgery, University of Michigan, 1918; died October 5; aged 56.

Reed, James H., Everett, Mass.; Dental School, Harvard University, 1915; died November 5.

Reiss, Edward, Terre Haute, Ind.; Louisville College of Dentistry of Centre College, 1899; died October 21; aged 75.

Reiss, Herman L., New York; New York College of Dentistry, 1914; died October 30; aged 58.

Reyer, Edward, Scranton, Pa.; Chicago College of Dental Surgery, Loyola University, 1895; died November 9; aged 81.

Rich, Emil L., Jackson, La.; Baltimore College of Dental Surgery, 1906; died November 7; aged 65.

Ritz, Frederick W., Bridgehampton, N. Y.; School of Dentistry, University of Pennsylvania, 1928; died November 13; aged 51.

Romer, John A., Port Richmond, N. Y.; New York College of Dentistry, 1901; died December 7; aged 72.

Rose, Virgil L., Seattle; School of Dentistry, North Pacific College of Oregon, 1926; died November 4; aged 50.

Rubin, Moses B., Brooklyn; School of Dental and Oral Surgery, Columbia University, 1926; died November 15; aged 47.

Schewe, Edward F., Huntington Park, Calif.; School of Dentistry, Washington University, St. Louis, 1902; died November 20; aged 78.

Schmitt, Fred J., Wilkes-Barre, Pa.; died November 12.

Schwind, Walter E., Evanston, Ill.; School of Dentistry, Vanderbilt University, 1891; died November 30; aged 89.

Seal, Sherrill J., Los Angeles; School of Dentistry, University of Louisville, 1920; died November 4.

Seth, Irving E., Seattle; College of Dentistry, University of Minnesota, 1922; died November 1; aged 50.

Shunck, Jeremiah D., Columbiaville, Mich.; School of Dentistry, Royal College of Dental Surgeons, Toronto, 1880; died November 1; aged 93.

Simon, Walter R., Anderson, Ind.; Indiana Dental College, 1913; died October 13; aged 62.

Smook, Theodore, Winner, S. D.; Dental School, Northwestern University, 1908; died October 15; aged 66.

Somersett, John C., Crockett, Calif.; College of Dentistry, University of California, 1900; died November 3.

Spann, Lionel L., Detroit; Dental Department, Meharry Medical College, 1922; died October 11; aged 53.

Stepan, Herman A., Cincinnati; died October 12; aged 59.

Stockover, Frank E., Greeley, Colo.; Kansas City Dental College, 1888; died November 14.

Suchorski, Vincent A., Bayonne, N. J.; Baltimore College of Dental Surgery, 1913; died November 19; aged 60.

Sutherland, James R., Monroe, N. Y.; New York Dental School, 1899; died October 28; aged 78.

Swartz, Albert, Canton, Ohio; Chicago College of Dental Surgery, Loyola University, 1926; died October 8; aged 47.

Taylor, Henry H., Minneapolis; College of Dentistry, University of Minnesota, 1893; died October 28; aged 83.

Taylor, William S., Lewistown, Pa.; Philadelphia Dental College, 1902; died October 29; aged 70.

Teskey, Edward L., Hill City, S. D.; Dental School, Northwestern University, 1904; died June 15; aged 81.

Thatcher, Arthur G., Fremont, Ohio; School of Dentistry, University of Pennsylvania, 1900; died July 14; aged 79.

Thode, Guy E., Burlington, Iowa; College of Dentistry, University of Iowa, 1902; died November 6.

Tichenor, Ruth, Miami, Fla.; School of Dentistry, University of Louisville, 1919; died October 31; aged 59.

Von der Porten, Hans A., New York; New York College of Dentistry, 1916; died March 3; aged 72.

Warren, Mary L., Hartford, Conn.; School of Dentistry, Temple University, 1900; died November 1; aged 75.

Wasser, George N., Cleveland; School of Dentistry, Western Reserve University, 1895; died November 9; aged 82.

Weinberger, Julius M., New York; New York College of Dentistry, 1910; died November 28; aged 62.

Wheeler, Sperry G., Rochester, N. Y.; School of Dentistry, University of Pennsylvania, 1917; died October 11; aged 60.

Wilson, Edward J., Minturn, Colo.; Kansas City Dental College, 1901; died October 16; aged 75.

Wise, Fannie E. S., Oakland, Calif.; College of Dentistry, University of California, 1897; died November 25; aged 71.

Wisler, Edwin C., Cleveland; School of Dentistry, University of Pennsylvania, 1915; died August 17; aged 73.

Wolfe, William H., Old Saybrook, Conn.; died September 13; aged 66.

CONTENTS

FEBRUARY 1952 • VOLUME 44 • NUMBER 2

The dentist's responsibility in fluoridation of municipal waters—Symposium 133
The study of mottled enamel—McKay 133
The chemist looks at fluoridation—Black 137
The practicing dentist's viewpoint—Nicholson 144
A public health dentist's viewpoint—Bull 147
Summarization of the subject—Gruebbel 151
Relation of endemic dental fluorosis to malnutrition—Massler 156
Diagnosis and treatment of fractured anterior teeth—Dunn 166
Anhidrotic ectodermal dysplasia with anodontia—Everett 173
The mechanics of dental structures—Smyd 187
Orthodontic diagnosis for the general practitioner—Gershater 194
Reports of councils 204
McKay and Horner, honorary members of the Association 208
Editorials 211
Washington news letter 214
News of dentistry 215
Current literature 231
Book reviews 236
Deaths 241
Directory 245
Announcements 247

Directory

OFFICERS

LeRoy M. Ennis, President.....4001 Spruce St., Philadelphia
Otto W. Brandhorst, President-Elect.....4952 Maryland Ave., St. Louis
David J. Fitzgibbon, First Vice-President.....601 19th St., N.W., Washington, D.C.
Perley M. Cunningham, Second Vice-President.....510 Hynds Bldg., Cheyenne, Wyo.
Oscar P. Snyder, Third Vice-President...Walter Reed Army Medical Center, Washington, D.C.
Ernest G. Sloman, Speaker, House of Delegates.....344 14th Street, San Francisco
Harold Hillenbrand, Secretary.....222 E. Superior St., Chicago
C. Willard Camalier, Assistant Secretary.....1726 Eye St., N.W., Washington, D.C.
Louis M. Cruttenden, Assistant Secretary.....222 E. Superior St., Chicago
H. B. Washburn, Treasurer.....Lowry Medical Arts Bldg., St. Paul
Lon W. Morrey, Editor.....222 E. Superior St., Chicago

BOARD OF TRUSTEES

William R. Alstadt, 1954, Twelfth District.....610 Boyle Bldg., Little Rock, Ark.
Bernerd C. Kingsbury, 1954, Thirteenth District.....490 Post St., San Francisco
Percy T. Phillips, 1954, Second District.....18 E. 48th St., New York
Clarence S. Renouard, 1954, Eleventh District.....304 Phoenix Bldg., Butte, Mont.
W. Earle Craig, 1953, Third District.....8113 Jenkins Arcade, Pittsburgh
L. H. Jacob, 1953, Eighth District.....Jefferson Bldg., Peoria, Ill.
James E. John, 1953, Fifth District.....Medical Arts Bldg., Roanoke, Va.
Daniel F. Lynch, 1953, Fourth District.....1678 Primrose Road, N.W., Washington, D.C.
Obed H. Moen, 1953, Ninth District.....Watertown, Wis.
J. B. Carr, 1952, Seventh District.....Hume Mansur Bldg., Indianapolis
C. S. Foster, 1952, Tenth District.....Dows Bldg., Cedar Rapids, Iowa
Charles I. Taggart, 1952, First District.....139 Bank St., Burlington, Vt.
Robert P. Thomas, 1952, Sixth District.....Francis Bldg., Louisville, Ky.

BUREAUS

Economic Research and Statistics: B. D. Moen, Director, 222 E. Superior St., Chicago
Library and Indexing Service: Donald A. Washburn, Director, 222 E. Superior St., Chicago
Public Information: Herbert B. Bain, Director, 222 E. Superior St., Chicago

COUNCILS

Constitution and Bylaws: Max E. Ernst, Chm., Lowry Medical Arts Bldg., St. Paul
Dental Education: E. R. Westcott, Chm., The Mayfair, Albany and Atlantic Aves., Atlantic City, N.J.
Shailer Peterson, Secy., 222 E. Superior St., Chicago

Dental Health: David W. Brock, Chm., 6026 Enright Ave., St. Louis 12
Allen O. Gruebbel, Secy., 222 E. Superior St., Chicago

Dental Museum and Registry: Henry A. Swanson, Chm., 1726 Eye St., N.W., Washington, D.C.

Dental Research: J. L. T. Appleton, Chm., 4001 Spruce St., Philadelphia

Dental Therapeutics: Thomas J. Hill, Chm., 2085 Adelbert Road, Cleveland
J. Roy Doty, Secy., 222 E. Superior St., Chicago

Dental Trade and Laboratory Relations: F. W. Herbine, Chm., 230 N. Fifth St., Reading, Pa.

Federal Dental Services: R. H. Friedrich, Chm., 960 Park Ave., Plainfield, N.J.

Hospital Dental Service: Frank B. Hower, Chm., 814 Heyburn Bldg., Louisville, Ky.

Insurance: Paul W. Zillmann, Chm., 29 Walden Ave., Buffalo

International Relations: D. J. Aubertine, Chm., 760 Market St., San Francisco

Journalism: Charles A. Wilkie, Chm., 1 Hanson Place, Brooklyn

Judicial Council: H. B. McCarthy, Chm., 5821 Bellona Ave., Baltimore

Legislation: E. Harold Gale, Chm., 142 Washington Ave., Albany, N.Y.
Francis J. Garvey, Secy., 222 E. Superior St., Chicago

Membership: H. C. Jarvis, Chm., Mercantile Library Bldg., Cincinnati

National Board of Dental Examiners: Robert J. Wells, Chm., 1525 E. 53rd St., Chicago
Shailer Peterson, Secy., 222 E. Superior St., Chicago

Relief: Leo W. Kremer, Chm., 55 E. Washington St., Chicago

Scientific Session: William A. Garrett, Chm., Candler Bldg., Atlanta, Ga.

SECTION CHAIRMEN

Operative Dentistry: Morton H. Mortonson, Jr., 735 N. Water St., Milwaukee

Oral Surgery and Anesthesia: H. Newman Brownson, 7046 Hollywood Blvd., Hollywood, Calif.

Orthodontics and Oral Development: William R. Joule, 549 High St., Newark, N.J.

Pedodontics: William A. Jordan, Minnesota Dept. of Health, University Campus, Minneapolis

Periodontics: Walter Leabo, 706 Medical Arts Bldg., Shreveport, La.

Practice Management: Charles H. Kendall, 2866 N. Oakland Ave., Milwaukee

Prosthodontics, Full Dentures: Theodore A. Bodine, 904 Akron Savings and Loan Bldg., Akron, Ohio

Prosthodontics, Partial Dentures: Alfred C. Young, 121 University Place, Pittsburgh

Public Health Dentistry: Bruce D. Forsyth, USPHS, Fourth and D Sts., S.W., Washington, D.C.

Research: John W. Knutson, USPHS, Federal Security Building South, Washington, D.C.

Roentgenology: William J. Updegrave, 230 W. Duncannon Ave., Philadelphia

THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION
222 East Superior Street, Chicago 11, Illinois
WHitehall 4-6730

LON W. MORREY, *Editor* JOHN J. HOLLISTER, *Business Manager*

All expressions of opinions and all statements of supposed facts are published on the authority of the writer over whose signature they appear, and are not to be regarded as expressing the views of the American Dental Association, unless such statements or opinions have been adopted by the Association. *Articles* are accepted with the understanding that they have not been published previously and that they are submitted solely to THE JOURNAL. *Advertising copy* must conform to the official standards established by the American Dental Association. *Notice of change of address* should be received one month before the change is to be effective. *Orders of reprints of* JOURNAL articles must be received by the Business Manager's office not later than the 15th of the month of issue in order to secure advantage of the lowest possible prices. Orders received after this date are subject to special quotation.

Announcements

MEETINGS OF THE AMERICAN DENTAL ASSOCIATION

Ninety-Third Annual Session	Sept. 8-11, 1952	St. Louis
Ninety-Fourth Annual Session	Sept. 28-Oct. 1, 1953	Cleveland
Ninety-Fifth Annual Session	Nov. 8-11, 1954	Miami

MEETINGS OF STATE SOCIETIES

State	Date	Place	Secretary	Address
Alabama	Apr. 14, 15	Birmingham	G. W. Matthews	1922 Tenth Ave., S., Birmingham 5
Alaska	July 14-17	Anchorage	R. A. Smithson	Box 1293, Anchorage
Arizona	Apr. 24-26	Phoenix	E. M. Scott	17 E. Welden Ave., Phoenix
Arkansas	Apr. 6-9	Little Rock	D. M. Hamm	White Bldg., Clarksville
California	Apr. 21-23	San Francisco	L. R. Ludwigsen	450 Sutter St., San Francisco
S. California	May 5-7	Los Angeles	C. A. Moss	1401 S. Hope St., Los Angeles
Colorado	Oct. 5-8	Colorado Springs	R. A. Downs	724 Republic Bldg., Denver 2
Connecticut	May 21-23	Bridgeport	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware			S. J. Krygier	309 S. State St., Dover
District of Columbia	Mar. 9-12	Washington	K. H. Wood	202-1835 Eye St., N. W., Washington
Florida	Apr. 20-23	Jacksonville	T. A. Price	808 Congress Bldg., Miami
Georgia	Nov.	Savannah	J. M. Heard, Jr.	803 Persons Bldg., Macon
Hawaii	June 11-14	Honolulu	J. H. Dawe	810 N. Vineyard St., Honolulu 17
Idaho	June 30-July 2	Sun Valley	F. E. Carpenter	123 Main Ave., W., Twin Falls
Illinois	May 19-22	Springfield	P. W. Clopper	623 Jefferson Bldg., Peoria 2
Indiana	May 12-14	Indianapolis	E. E. Ewbank	Kingman
Iowa	May 5-7	Des Moines	H. I. Wilson	639 Insurance Exchange Bldg., Des Moines
Kansas	May 11-14	Topeka	F. A. Richmond	861 Brotherhood Bldg., Kansas City
Kentucky	Mar. 31-Apr. 2	Louisville	A. B. Coxwell	1976 Douglas Blvd., Louisville
Louisiana	Apr. 17-19	Shreveport	J. S. Bernhard	2515 Line Ave., Shreveport
Maine	June	Rockland	S. Gower	Skowhegan
Maryland	May 4-7	Baltimore	E. L. Pessagno, Jr.	415 Medical Arts Bldg., Baltimore 1
Massachusetts	May 4-7	Boston	H. E. Tingley	12 Bay State Road, Boston
Michigan	Apr. 21-23	Detroit	F. Wertheimer	Michigan Dept. of Health, Lansing
Minnesota	Feb. 18-20	St. Paul	C. V. E. Cassel	242 Lowry Medical Arts Bldg., St. Paul
Mississippi	June 9-12	Biloxi	H. M. Campbell	102 Professional Bldg., Tupelo
Missouri	Sept. 12	St. Louis	R. R. Rhoades	201 Merchants Bank Bldg., Jefferson City
Montana	May 8-10	Butte	C. S. Renouard	304 Phoenix Bldg., Butte
Nebraska	May 12-14	Omaha	F. A. Pierson	1112 Federal Securities Bldg., Lincoln
Nevada	June	Reno	R. La Fond	Medical Dental Bldg., Reno
New Hampshire	June 29-July 1	Bretton Woods	F. E. Williams	814 Elm St., Manchester
New Jersey	Apr. 23, 24	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico	Apr. 14-16	Roswell	J. S. Eilar	Suite 7, Medical Arts Square, Albuquerque
New York	May 12-15	Syracuse	C. A. Wilkie	1 Hanson Place, Brooklyn
North Carolina	May 11-14	Pinehurst	B. N. Walker	Liberty Life Bldg., Charlotte
North Dakota	May 15-17	Minot	J. H. Lunday	302 Black Bldg., Fargo
Ohio			E. G. Jones	185 E. State St., Columbus
Oklahoma	Apr. 20-23	Oklahoma City	R. C. Calkin	109½ W. Oklahoma, Guthrie
Oregon	Mar. 3-5	Portland	H. C. Fixott, Jr.	308 Selling Bldg., Portland
Panama Canal Zone			O. Slavin	Box 415, Balboa
Pennsylvania	May 4-7	Reading	M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico			R. Carrasquillo	Box 214, Rio Piedras

State	Date	Place	Secretary	Address
Rhode Island			M. L. Biderman	144 Westminster St., Providence
South Carolina		Greenville	J. R. Owings	7 Medical Court, Greenville
South Dakota	May 18-20	Mitchell	E. W. Elmen	Sioux Falls
Tennessee	May 5-7	Memphis	W. L. McCulley	Brown Bldg., Cleveland
Texas	Apr. 28-May 1	Fort Worth	W. Ogle	3607 Gaston Ave. Medical Bldg., Dallas
Utah	June 11-14	Zion National Park	E. O. Thompson	915 Medical Arts Bldg., Salt Lake City
Vermont	May	Woodstock	W. J. Reardon	Rutland
Virginia	Apr. 28-30	Virginia Beach	J. E. John	804 Medical Arts Bldg., Roanoke
Washington	May 15-17	Seattle	C. R. Flood	1130 Medical-Dental Bldg., Seattle
West Virginia	July	White Sulphur Springs	A. B. Drake	508 West Virginia Bldg., Huntington 1
Wisconsin	Apr. 14-17	Milwaukee	R. A. Mason	964 N. 27th St., Milwaukee
Wyoming		Casper	T. J. Drew	State Capitol Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama	June 16	Birmingham	M. D. Edwards	132 Adams Ave., Montgomery
Alaska	July 7-11	Anchorage	J. H. Geyer	P. O. Box 915, Juneau
Arizona			R. K. Trueblood	25 N. Second Ave., Glendale
Arkansas	June 23-26		H. O. Weatherly	205 Halter Bldg., Conway
California			K. I. Nesbitt	507 Polk St., San Francisco 2
Colorado	June 23-27	Denver	C. K. Phillips	724 Republic Bldg., Denver 2
Connecticut			C. G. Brooks	302 State St., New London
Delaware	June 16-18*	Wilmington	P. K. Musselman	143 W. Main St., Newark
District of Columbia			W. M. Falls	1801 Eye St., N. W., Washington 6
Florida	July 7-12*	Jacksonville	A. W. Kellner	P. O. Box 155, Hollywood
Georgia			S. H. Yarbrough	Medical Arts Bldg., Columbus
Hawaii	Feb. 20-23	Honolulu	H. L. Houvener	427 Dillingham Bldg., Honolulu
Idaho			W. K. Adams	718 Arthur St., Caldwell
Illinois			W. A. McKee	503 Wood Bldg., Benton
Indiana	June 17-20*	Indianapolis	C. A. Frech	504 Broadway, Gary
Iowa	May 19-23	Iowa City	H. M. Willits	719 Roshek Bldg., Dubuque
Kansas			G. L. Teall	Box 71, Hiawatha
Kentucky	June 2-5	Louisville	R. I. Todd	Western Union Bldg., Richmond
Louisiana			A. R. deNux	Marksville
Maine			R. A. Derbyshire	Box 387, Skowhegan
Maryland	June 9-11	Baltimore	H. Levin	3429 Park Heights Ave., Baltimore 15
Massachusetts	June 23, 24, 26, 27‡ June 25-27‡‡	Boston	J. C. Wilson	State House, Boston 33
Michigan	Jan. 27-Feb. 2 June 8-14	Ann Arbor	J. L. Champagne	3714 W. McNichols Road, Detroit 21
Minnesota			F. A. Larson	1632 Washington St., N. E., Minneapolis
Mississippi	June 17-19*	Jackson	J. C. Boswell	508 Lamar Life Bldg., Jackson
Missouri			R. R. Rhoades	Central Trust Bldg., Jefferson City
Montana			P. M. Feda	Box 865, Helena
Nebraska			H. E. Weber	1210 Federal Securities Bldg., Lincoln
Nevada			G. C. Steinmiller	Masonic Temple, Reno
New Hampshire	June 20, 21		D. J. Freese	4 Wall St., Concord
New Jersey			W. A. Wilson	150 E. State St., Trenton 8
New Mexico			J. J. Clarke, Sr.	Artesia
New York			D. W. Beier	23 S. Pearl St., Albany 7
North Carolina			F. O. Alford	1109 Liberty Life Bldg., Charlotte 2
North Dakota	July 7-11	Fargo	A. B. Crabtree	Ellendale
Ohio	June 23-27	Columbus	H. B. Smith	322 E. State St., Columbus
Oklahoma			J. B. Cole, Jr.	706 Asp, Norman
Oregon	June 9-12*		F. L. Utter	506 Pioneer Trust Bldg., Salem
Pennsylvania	June 19-21** June 21†† June 23-25†	Philadelphia Philadelphia and Pittsburgh	R. E. V. Miller	Northampton National Bank Bldg., Easton
Puerto Rico		Santurce	L. C. Coll	Box 3717, Santurce
Rhode Island			F. M. Hackett	267 Academy Ave., Providence

State	Date	Place	Secretary	Address
South Carolina	June 26-28		T. C. Sparks	1315 Pickens St., Columbia
South Dakota			K. A. Stormo	Lead
Tennessee	June 9-13	Memphis	F. S. Maxey	804 Bennie Dillon Bldg., Nashville 3
Texas			R. T. Weber	312 Capital National Bank Bldg., Austin
Utah			F. E. Lees	324 State Capitol Bldg., Salt Lake City
Vermont	June 23-25	Montpelier	F. A. Reid	Windsor
Virginia			J. M. Hughes	715 Medical Arts Bldg., Richmond 19
Washington			J. B. Kiefer, Jr.	510 Cobb Bldg., Seattle
West Virginia	June 23-25	West Liberty	C. A. Laughlin	613 Prunty Bldg., Clarksburg
Wisconsin	June 16-20*	Milwaukee	S. F. Donovan	Tomah
Wyoming	June 23-25	Casper	W. A. Hocker	212 O & S Bldg., Casper

*Dentistry and dental hygiene.
**Dental clinical examinations.
†Dental and dental hygiene written examinations.
††Dental hygiene clinical examinations.
‡Dental examinations.
‡‡Hygienists' examinations.

MEETINGS OF OTHER ORGANIZATIONS

Name	Date	Place	Secy. or Chm.	Address
Academy of Denture Prosthetics	Mar. 16-22	New Orleans	I. L. Furnas Secy.	928 Silverado St., La Jolla, Calif.
American Academy of Dental Medicine	May 29-31	Montreal, Canada	W. M. Greenhut, Secy.	124 E. 84th St., New York 28
American Academy of Oral Pathology	Feb. 3	Chicago	J. L. Bernier Secy.	Registry of Dental and Oral Pathology, Army Medical Museum, Washington, D.C.
American Academy of Restorative Dentistry	Feb. 2, 3	Chicago	A. G. James Secy.	409 N. Camden Drive, Beverly Hills, Calif.
American Association of Dental Examiners	Sept. 5, 6	St. Louis	C. A. Bumstead Secy.	924 Stuart Bldg., Lincoln, Neb.
American Association of Endodontists	Feb. 2, 3	Chicago	N. W. Burkman Secy.	525 Merrill St., Birmingham, Mich.
American Association of Industrial Dentists	Apr. 22-24	Cincinnati	E. R. Aston Secy.	1400 N. Cameron St., Harrisburg, Pa.
American Association of Orthodontists	Apr. 21-24	St. Louis	G. R. Moore Secy.	919 Oakland Ave., Ann Arbor, Mich.
American Board of Dental Public Health	Sept.	St. Louis	P. E. Blackerby, Jr. Secy.	250 Champion St., Battle Creek, Mich.
American Board of Orthodontics	Apr. 16-20	St. Louis	C. E. Martinek Secy.	661 Fisher Bldg., Detroit, 2
American Board of Pedodontics	Aug. 4-7	San Francisco	R. L. Ireland Secy.	College of Dentistry, University of Nebraska, Lincoln, Neb.
American Board of Prosthodontics	Jan. 28-Feb. 2	Milwaukee	I. R. Hardy Secy.	Tufts College Dental School, 136 Harrison Ave., Boston 11
American Dental Society of Europe	July 15-18	London, England	F. D. Derrick Secy.	140 Park Lane, London W. 1, England
American Denture Society	Feb. 2, 3	Chicago	A. L. Roberts Secy.	Aurora National Bank Bldg., Aurora, Ill.
American Public Health Association	Oct. 20-24	Cleveland	R. M. Atwater Exec. Secy.	1790 Broadway, New York 19
American Society for the Advancement of General Anesthesia in Dentistry	Mar. 24	New York	M. H. Feldman Exec. Secy.	730 Fifth Ave., New York 19
American Society of Oral Surgeons	Oct. 8-11	New Orleans	R. F. Whalen Exec. Secy.	1112 E. Clay St., Richmond, Va.
Canadian Dental Association and British Columbia Dental Association, Golden Jubilee	June 15-18	Vancouver, B. C., Canada	C. M. Whitworth Secy.	Joint Convention Committee, Canadian Dental Association, 218 Medical-Dental Bldg., Vancouver, B. C., Canada
Chicago Dental Society	Feb. 4-7	Chicago	K. S. Richardson Exec. Secy.	30 N. Michigan Ave., Chicago

Name	Date	Place	Secy. or Chm.	Address
Council on Dental Education, Division of Aptitude Testing	Mar. 7, 8		S. Peterson Secy.	222 E. Superior St., Chicago 11
Eleventh International Dental Congress	July 19-26	London, England	G. H. Leatherman Hon. Secy.	13 Hill St., London W. 1, England
Greater Philadelphia	Jan. 30-Feb. 1	Philadelphia	R. Adams Secy.	1411 Walnut Street Bldg., Philadelphia 2
International Academy of Anesthesiology	Feb. 6	New York	I. G. Tomack Secy.	355 E. 149th St., New York 55
International Academy of Oral Dynamics	Mar. 9-12	Washington, D.C.	J. J. Greeves Pub. Chm.	1801 K St., N.W., Washington 6, D.C.
National Board of Dental Examiners	Apr. 7, 8 Dec. 1, 2		S. Peterson Secy.	222 E. Superior St., Chicago 11
Northeastern Society of Orthodontists	Mar 3, 4	New York	O. Jacobson Secy.	35 W. 81st St., New York
Northwest Conference in Dental Medicine	Apr. 13-17	Hood River, Ore.	P. L. Meacham Secy.	426 Medical Arts Bldg., Portland, Ore.
Seventh All-India Dental Conference	Feb. 6-9	Bombay, India	F. N. Mehta Org. Sec.	Sambava Chambers, Sir P. M. Road, Bombay 1, India
Southeastern Society of Oral Surgeons	Apr. 11, 12	Hollywood, Fla.	G. W. Matthews Editor	1922 Tenth Ave., S., Birmingham, Ala.
Southern Society of Orthodontists	Aug. 10-13	Asheville, N. C.	F. P. Bowyer Secy.	608 Medical Arts Bldg., Knoxville, Tenn.
Thomas P. Hinman Mid-Winter Clinic	Mar. 23-26	Atlanta, Ga.	R. D. Robinson Gen. Chm.	832 Candler Bldg., Atlanta, Ga.

CLASSIFIED ADVERTISING

Forms close on 25th of second month preceding month of issue

Remittance Must Accompany Classified Ads.

Advertisements cost $3.50 not exceeding 30 words, additional words 10c each. Commercial agency advertisements, $3.50 for 20 words, additional words 13c each. Publisher reserves the right to determine classification. An extra fee of 25c is charged advertisers who have answers sent care of A.D.A. and in such cases we do not furnish name or address to inquirers. This rate applies for each insertion.

PRACTICES AND OFFICES FOR SALE

CONNECTICUT—Oral surgery practice for sale. Fine clientele. Include all details in first letter, including financial ability. Address A.D.A. Box No. 9.

•

NEW YORK—Wonderful opportunity to acquire building and three-chair complete modern office near Broadway in New York city. Overload practice; income-producing property. $15,000 down. Address A.D.A. Box No. 97.

LOCATIONS AVAILABLE

MASSACHUSETTS—Dental office for rent; remodeled and decorated to suit tenant. Equipment, including new Ritter x-ray, may be rented or purchased. Direct replies to Dr. A. Alemian, 691 Broad Street, Weymouth, Massachusetts.

•

NEW YORK—Air conditioned suite available for orthodontist in professional building on Long Island. Share reception room with busy podiatrist and dentist. Across street from school, municipal parking, bus routes. Direct replies to Dr. H. J. Blass, Podiatrist, 80 South Grove Street, Freeport, New York.

OPPORTUNITIES AVAILABLE

CONNECTICUT—Dental hygienist wanted for position in small city located near Hartford. Address A.D.A. Box No. 10.

•

MARYLAND—Resident in Oral Surgery and Dental Intern wanted, beginning with July 1, 1952. Applicants for Residency must have Postgraduate or previous hospital training. Recent graduate accepted for Internship. Training in all surgical and related subjects. Applicants must be graduates of Accredited dental schools. Direct replies to Executive Director, Sinai Hospital, Baltimore 5, Maryland (Approved by (A.D.A.).

•

MICHIGAN — Philanthropic foundation wants dentists under 40 years of age for public health work. Starting salary rate, $4,500 per annum. Michigan licensure not required provided the individual is a graduate of an accredited dental school and is licensed in another state. For detailed information write Kenneth R. Gibson, D.D.S., M.S.P.H., Director of Child Health Division, Children's Fund of Michigan, 660 Frederick Street, Detroit 2, Michigan.

NEW YORK—Well established orthodontist seeks associate with training or experience. Will consider service exempt, capable young dentist for training. Address A.D.A. Box No. 11.

•

OHIO—Dentist under 65 wanted for institution for mentally retarded. Ohio license. Salary $5,040. Apartment and maintenance available. Direct replies to State Hospital, Gallipolis, Ohio.

•

PENNSYLVANIA—Manufacturing concern dealing in electronic equipment, primarily in dental and medical fields, offers employment opportunity — principally sales — to one qualified and financially responsible. Address A.D.A. Box No. 82.

OPPORTUNITIES WANTED

ORAL SURGEON—B.S., M.S., D.D.S., 1946 graduate of eastern university, desires association in field of oral surgery. Experience includes military service, hospital training in oral surgery and anesthesia, general practice, teaching of oral surgery. Eligible for American Board of Oral Surgery. Address inquiries to A.D.A. Box No. 12.

•

DENTIST — General practitioner, desires dental office or association in Florida. Well qualified; age 36. All negotiations strictly confidential. Address A.D.A. Box No. 13.

•

LAB TECHNICIAN—Specialist in plaster work for all types of dental restorations, desires association with dentist, dental college or dental organization. Noted for neatness and accuracy in making practical and specimen-type models. Will go anywhere. Address A.D.A. Box No. 14.

•

DENTIST—Ten years' experience in general practice, would like to associate with or purchase dental office in St. Louis or Missouri suburb from dentist contemplating retirement in near future. Address A.D.A. Box No. 15.

•

DENTIST desires association with oral surgeon in New York state. Partnership, ultimate aim. Address A.D.A. Box No. 16.

MISCELLANEOUS

WANTED TO BUY—Old or used dental books or journals. Leo L. Bruder, 1 De Kalb Avenue, Dept. 21, Brooklyn, New York. Dealer in out-of-print Dentistry.

Burneice Larson, Director

The Medical Bureau

Palmolive Building

Chicago, Illinois

OPPORTUNITIES WANTED

WANTED — Opportunities for great group of well qualified Dentists. Among our candidates are those who have specialized in the various fields of Dentistry and, also, men and women qualified for Teaching, Public Health Work and General Practice. Please outline your requirements and credentials of qualified candidates will follow. All negotiations strictly confidential.

OPPORTUNITIES AVAILABLE

WANTED — Dentists qualified in the various Dental specialties and for Teaching, Public Health Work and General Practice. Opportunities in all parts of America including countries outside continental United States. All negotiations strictly confidential. Please send for our ANALYSIS FORM so that we may prepare an individual Survey of opportunities in your particular field.

SOLID BRONZE NAME SIGNS

Cast, raised letters, drilled, with screws

3" x 12" — $10.80	3" x 14" — $12.60	3" x 16" — $14.40
4" x 14" — $16.80	4" x 16" — $19.20	4" x 18" — $21.60
5" x 16" — $24.00	5" x 18" — $27.00	5" x 20" — $30.00
6" x 18" — $32.40	6" x 20" — $36.00	6" x 25" — $45.00

Other sizes 30c per square inch. Signs with wording on both sides 45c per square inch.

COLLECT PLEASE SEND CHECK WITH ORDER

LAUER METAL SHOP · 1516 E. Baltimore Street · Baltimore 31, Md.

are you MOVING ?

Giving us advance notice will keep the Journal coming to you without interruption. *Here's a handy form to use:*

Name .....

Old Address .....

New Address .....

Mail to **American Dental Association, 222 E. Superior St., Chicago 11, Ill.**

Porcelain Fillings

stay beautiful

with Lee S. Smith CERTIFIED ENAMEL...

Color Stability is increased

disintegration decreased

Your skillful matching provides a perfect porcelain filling. Color stability of CERTIFIED ENAMEL keeps the filling attractive. CERTIFIED cohesion protects against washouts. 50% less disintegration than permitted by the A.D.A. Specifications No. 9 is your guarantee of a lastingly beautiful porcelain filling.

ASK YOUR DEALER FOR

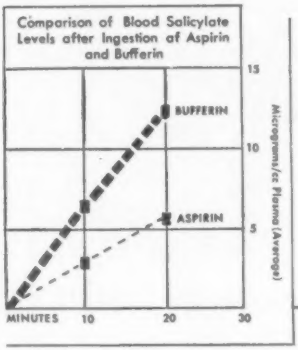
Certified Enamel
IMPROVED

LEE S. SMITH & SON MANUFACTURING CO.
Certified Products for Modern Dentistry
842 NORTH WELLS STREET, CHICAGO 10, ILLINOIS

Faster Pain Relief with BUFFERIN

1 ACTS TWICE AS FAST AS ASPIRIN

The antacids in Bufferin speed its pain-relieving ingredients through the stomach and into the blood stream. Actual chemical determinations show that within ten minutes after Bufferin is ingested blood salicylate levels are higher than those attained by aspirin in twice this time.[1]



2 DOES NOT UPSET THE STOMACH

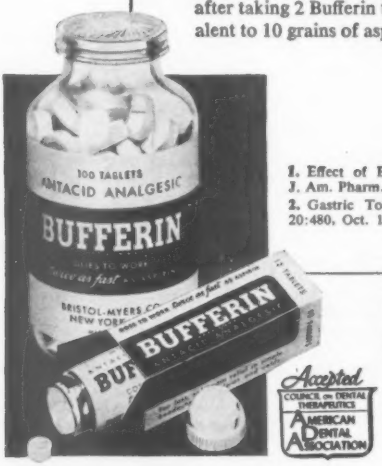
Bufferin's antacid ingredients protect the stomach against aspirin irritation. This has been clinically demonstrated on hundreds of patients.

in usual doses

In a series of 238 cases, 22 had a history of gastric distress due to aspirin but only one reported any distress after taking 2 Bufferin tablets (equivalent to 10 grains of aspirin).[1]

in large doses

In a recent study group, 1006 patients received, over a 24 hour period, 12 Bufferin tablets (equivalent to 60 grains of aspirin). Although 72 had a history of being sensitive to aspirin, only 18 reported any gastric side-effect with Bufferin.[2]



1. Effect of Buffering Agents on Absorption of Acetylsalicylic Acid. J. Am. Pharm. Assoc., Sc. Ed. 39:21, Jan. 1950
2. Gastric Tolerance for Aspirin and Buffered Aspirin. Ind. Med. 20:480, Oct. 1951

INDICATIONS: Simple headaches, neuralgias, dysmenorrhea, muscular aches and pains, discomfort of colds and minor injuries. Particularly useful when gastric hyperacidity is a complication. Useful for relieving pain in the treatment of arthritis. Helpful for toothaches and pain following tooth extraction.

EACH BUFFERIN TABLET contains 5 grains of acetylsalicylic acid, together with optimum amounts of the antacids aluminum glycinate and magnesium carbonate.

AVAILABLE in vials of 12 and 36 tablets and in bottles of 100. Tablets scored for divided dosage.

BUFFERIN is a trade-mark of the Bristol-Myers Company.
Bristol-Myers Co., 19 West 50 St., New York 20, N. Y.

PLASTIC PARTIALS for YOUNG PEOPLE

In these cases — which often involve a bite that is SHORT or CLOSE — Steele's facings serve admirably to replace anterior teeth. (A Steele's facing is *thinner* in its labial-lingual dimension than a denture tooth.

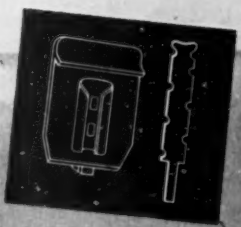
You simply cement the interchangeable Steele's facing to a Steele's *Denture Backing* embedded in the plastic denture material. Use reinforcing bars to give strength and rigidity to the narrow isthmus of denture material supporting one or two isolated teeth. Where a number of adjacent teeth are involved, the reinforcing bars are unnecessary. The technic is simple.

Steele's

Interchangeable Facings

WITH

Denture Backings



THE COLUMBUS DENTAL MFG. CO. • COLUMBUS 6, OHIO

Marvel

OF PROFESSIONAL SKILL

but..

its merits are lost if it's left in the bureau drawer—instead of being kept in the patient's mouth.

Many patients, discouraged by the handicap of anatomical or psychological difficulties, find their confidence helpfully stimulated by the use of Wernet's Powder during the first critical weeks of adaptation. Its soft, resilient cushion improves retention and stability, and enables the patient to master the new denture more quickly and more effectively.

If you need office samples, use the handy coupon for a complimentary supply.

Wernet Dental Mfg. Co., Inc.
Jersey City 2, N. J.

WERNET'S POWDER

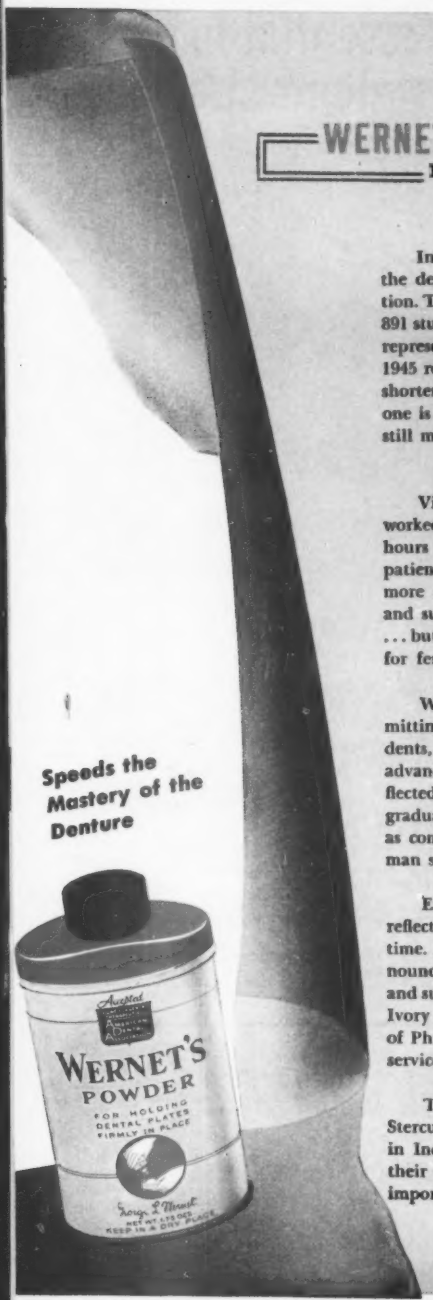
WERNET DENTAL MFG. CO., INC.
Jersey City 2, N. J. Dept. 6-B

Please send gratis an office supply of Wernet's Powder.

Dr._____

Address_____

City_____ State_____



WERNET DENTAL LORE

FEBRUARY 1952

Increased military needs have pointed up the desirability of accelerating dental education. The 1950 undergraduate enrollment (11,891 students) in the country's 42 dental schools represents an increase of nearly 64% over the 1945 registration. And, while two schools have shortened their program to three years, and one is optionally shortened, 39 of the schools still maintain their 4-year curriculum.

• • •

Vital statistics: In 1949, the average dentist worked 33 hours per week at the chair, and 5 hours in the laboratory. He saw more female patients than male, at every age level. He did more extractions on males than on females, and supplied more *upper* dentures for males ... but (oddly enough), more *lower* dentures for females.

• • •

While the country's dental schools are admitting an ever-increasing number of new students, they are not neglecting provision for advanced studies at the same time. This is reflected in the 1950-51 enrollment of 2,679 graduate, postgraduate and special students, as compared (for instance) with 3,226 freshman students.

• • •

Early American progress in prosthetics is reflected by newspaper advertisements of the time. In 1749, a Parisian dentist, Roquet, announced in Boston that he drew decayed teeth and substituted "an entire Sett of right African Ivory Teeth"; and in 1761, Hugh Tomb, M.D., of Philadelphia, professed to render the same service.

• • •

The periodic, scientific slashing of the Sterculia species of tropical shrubs and trees in India increases the natural production of their exudate, karaya gum, which forms so important a part of Wernet's Powder.

DAIRY FOODS – essential to our nation's strength

Research tells us "why"...

Modern research is constantly adding to our knowledge of milk and its products . . . just another example is the addition of the recently isolated and identified vitamin B_{12} to the list of *more than 100 different nutrients*[1] now known to be present in milk. Laboratory analyses show milk to contain an average of four micrograms of this vitamin per liter.[2]

The functions as well as the nature of the nutrients of milk are revealed by research. In the laboratory, scientists have solved a puzzling nutritional "mystery"—why milk is helpful in the dietary treatment of niacin deficiencies. It is because tryptophane, an amino acid present in milk, can form niacin in the body.[3]

Many such instances of interrelationships between nutrients emphasize the importance of milk as a "nutritional whole." Two examples worthy of note are the physiologically desirable ratio between calcium, phosphorus, and magnesium in milk,[4] and the favorable effect of lactose on the absorption of calcium,[5] and possibly of other minerals.

The beneficial effects of dairy foods—milk, butter, cheese, ice cream—on our national health are constantly demonstrated by research.

1. National Research Council. The composition of milks. Bulletin No. 119, Washington 1950.

2. Collins, R. A., Harper, A. E., Schrieber, M. and Elvehjem, C. A. The folic acid and vitamin B_{12} content of the milk of various species. J. Nutr. *43*:423 (Feb.) 1951.

3. Mechanics of niacin formation, Nutrition Reviews, *8*:211 (July) 1950.

4. Stearns, C. Human requirements of calcium, phosphorus, magnesium. J. Am. Med. Assn. *142*:478 (Feb.) 1950.

5. Mills, R., Breiter, H., Kempster, E., McKey, B., Pickens, M. and Outhouse, J. The influence of lactose on calcium retention in children. J. Nutr. *20*:467 (Nov.) 1940.

The presence of this seal indicates that all nutrition statements in this advertisement have been found acceptable by the Council on Foods and Nutrition of the American Medical Association.

National DAIRY COUNCIL
111 N. Canal Street, Chicago 6, Illinois

Since 1915 . . . the National Dairy Council, a non-profit organization, has been devoted to nutrition research and education to extend the use of dairy products.

ATTENTION! *Replica* users

Now available—a concise, easy to use procedural booklet.

The Replica Brush Method and "cotton roll" compression mixing procedures are included in this latest informative booklet. Although the information is pertinent to Replica, the general considerations presented should make the booklet helpful to all plastic filling material users.

If your dealer does not have a supply of this booklet, the coupon will bring a copy to you at once.

COSMOS DENTAL PRODUCTS, INC.
219 East 44th Street, New York 17, N. Y.

GENTLEMEN: Please send me your new plastic filling material booklet "PROCEDURES".

Dr. _____

Address _____

City _____ **Zone** _____

State _____

Dealer's Name _____

Speaking of

Available to dentists and physicians on request is this complete bibliography of 97 original articles.

Write toda
for your cop

backgrounds...

. . . clinical evidence of the effectiveness of XYLOCAINE ® HYDROCHLORIDE (Astra) has been compiled and reported in nearly 100 original papers. Its use as a dental anesthetic is within adequate margins of safety, and minimal volumes are sufficient for routine procedures. XYLOCAINE ® HYDROCHLORIDE (Astra) invites comparison with any of the local anesthetics commonly employed in modern dentistry. On this basis, and particularly when seeking local anesthesia that is extremely rapid in onset, deeply profound, widely diffused, and of adequate duration, a truly justified selection is the choice of . . .

XYLOCAINE® HYDROCHLORIDE

ASTRA

(Brand of lidocaine hydrochloride*)

a **PREFERRED** ***NEW*** **local anesthetic**

SUPPLIED — Stocked by leading dental supply dealers as a 2% solution, without epinephrine and with epinephrine 1:100,000 or 1:50,000; dispensed in 1.8cc cartridges, packed 50 cartridges to a vacuum-sealed tin. Also available in 20cc multiple-dose vials packed 5 vials to a carton.

ASTRA PHARMACEUTICAL PRODUCTS, INC.
Worcester, Mass. U. S. A.

*U.S. Patent No. 2,441,498

New Mosby Books

In Dental Physiology

The Physiological Foundation of Dental Practice

In Which Physiology is Considered Exclusively In Its Significance to Dental Practice

Drs. Langley and Cheraskin wrote this new book *not* for the general physiologist, nor for the medical man—but for the exclusive use of dental practitioners and students. The fundamentals of human function are described for the *dentist alone.*

Wherever possible, general principles in physiology have been illustrated with dental examples and the importance of these mechanisms to dental practice has been stressed. The book has been done with admirable brevity and the illustrations are almost entirely original drawings. Every one is of dental significance.

By **L. L. LANGLEY, M.A., Ph.D., and E. CHERASKIN, M.A., M.D., University of Alabama School of Dentistry, Birmingham, Alabama. 512 pages, 149 illustrations. PRICE, $8.25.**

Oral Physiology

Bolstering the current scientific ideas concerning the important part that teeth play in maintaining good health of children and adults alike, this book discusses the function of the teeth with the most advanced thought.

It answers such obvious questions as what role mastication has in the overall health of the patient; what accumulated effects of dental caries, malnutrition, ill health, and lack of dental care have in aging patients and offers convincing proof that good teeth and their normal use do play an important role in the maintenance of optimum health.

The material has been accumulated from many and varied sources and represents a very complete review of all the literature which might in any way be related to the general subject.

By **the late JOHN T. O'ROURKE, B.S., D.D.S., Sc.D. Edited by LeROY M. S. MINER, M.D., D.M.D., Sc.D., Dr.P.H., Boston, 333 pages. Price, $5.00.**

Order Form

The C. V. MOSBY Company, ADA 5-52
3207 Washington Blvd., St. Louis 3, Missouri

Please send me:

Langley-Cheraskin THE PHYSIOLOGICAL FOUNDATION OF DENTAL PRACTICE .....($8.25)

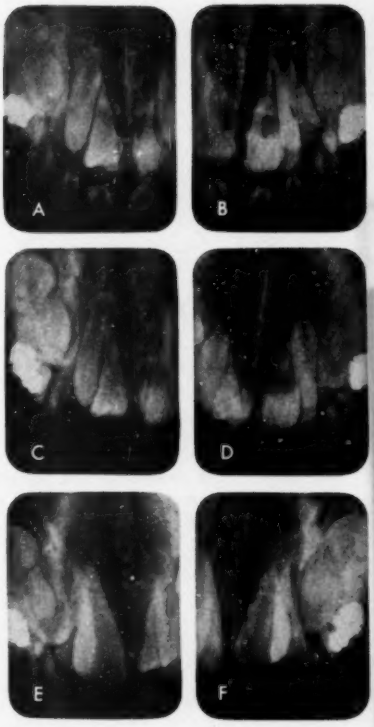
O'Rourke-Miner ORAL PHYSIOLOGY .....($5.00)

☐ Enclosed find check. ☐ Charge my account.

Name.....

Address.....

A "MUST" in the preventive treatment of incipient malocclusion



TWO YEARS AGO *parents questioned prolonged retention of deciduous incisor teeth. Radiographic examination (A and B) showed supernumerary teeth blocking eruption of permanent incisors. Deciduous teeth were removed to allow natural shifting of supernumeraries (C and D). About 1 year later, the supernumeraries were removed to permit eruption of permanent incisor teeth (E and F). Case is in process of being treated and illustrates the need for radiographic examination, accurate diagnosis, prompt and careful surgery.*

From files of George M. Anderson, D.D.S., author of "Practical Orthodontics," published by The C. V. Mosby Company.

IN ORTHODONTICS, as in other fields of dentistry, radiography affords a means of observing and interpreting conditions otherwise impossible to visualize. It enables the dentist to diagnose accurately, to proceed promptly with treatment or surgery.

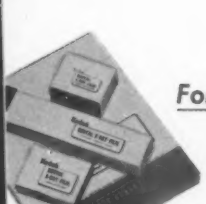
In all situations where radiography is required, the dentist who uses Kodak Film and Chemicals can proceed with maximum assurance, for these x-ray materials are made to work together . . . to produce finest results.

Kodak X-ray Films—Kodak Bite-Wing Film (for interproximal examinations) . . . Kodak Periapical Films (3 types)—Radia-Tized, Regular, and Ultra-Speed . . . Kodak Occlusal Film . . . Kodak Blue Brand Film and Kodak No-Screen Film (for extraoral studies).

Kodak X-ray Processing Chemicals—Kodak Concentrated Dental X-ray Developer . . . Kodak Concentrated Dental X-ray Fixer.

Other Kodak Products for Dentists: Film Chest, Dispenser, Receptacle . . . Exposure Holders . . . Intensifying Screens . . . Safelight Lamps and Filters . . . Processing Tanks . . . Processing Hangers . . . Thermometer . . . Film Corner Cutter.

Order through your regular dental dealer



For finest results:

USE KODAK FILM

PROCESS IN KODAK CHEMICALS

Eastman Kodak Company, *X-ray Division*, Rochester 4, N. Y.

Kodak
TRADE-MARK

WITH PRIDE AND PLEASURE, *we announce* Texton

TRADE MARK

A tough, strong, durable conspicuous, self-curing resin for class III and class V cavities.

We have put years of serious thought, study and investigation into the development of Texton. It is offered now, not as the sine qua non of filling materials, but as the best acrylic resin for filling teeth that can be developed in the light of present day knowledge and experience —as a material definitely superior to silicates when used in the field for which it is designed.

Texton is not a substitute for silicates. It is tougher, resists abrasion better than silicates, and should be used in locations where esthetics is desired, support of the tooth not a vital factor, and where silicates may fail because of their lack of toughness and resistance to abrasion.

Texton requires no special equipment.
Can be mixed on a tablet or in a dappen glass in 30 seconds.
Affords 2 minutes working time.
Has a short matrix holding time—only 5 minutes.
Can be used with the matrix and brush techniques.
Has a high compressive strength for a resin.
Contraction about the same as that of a silicate in 7 days.
Is less irritating to the pulp than a silicate—pH is 6-7.
Very small cavities require no liners.
Mouth breathing does not harm Texton.
It is more resistant to lipstick stain than silicate.
You can use your Filling Porcelain Improved Color Matching Guide and Color Matching technique because the colors of Texton and F.P.I. are the same.

WRITE FOR FREE TEXTON TECHNIQUE BOOK

describing and illustrating mixing, inserting, the brush, strip and compound matrix techniques. Physical properties are given and explained, so you can readily see Texton's relation to other filling materials and its place in your practice. Ask your dealer or write direct.

THE S. S. White

TEXTON 10-2 PACKAGE

10 Tooth colors,
4 Vials of Modifying colors
2 Bottles of liquid
1 Request card for a free Texton-Filling Porcelain color Matching Guide
1 Powder Measure
1 Plastic Texton Dispensing Tray

PRICE $31.70

TEXTON 6-2 PACKAGE

6 Popular Tooth Colors
2 Bottles of Liquid
1 Request card for a free Texton-Filling Porcelain Improved Color Matching Guide
1 Powder Measure

PRICE $20.00

TEXTON 3-1 PACKAGE

3 Most Popular Tooth Colors
1 Bottle of Liquid
1 Powder Measure

PRICE $10.80

For Sale by Your Local Dealer

DENTAL MFG. CO. 211 S. 12th Street, Philadelphia, Pa.

Announcing...

THE DENTAL APTITUDE TEST

for admission to
1952 Dental School Classes
will be given on this date:

MARCH 7-8, 1952

(application must be received by Feb. 21)

Applicants should contact any of the dental schools listed for copies of the brochure, THE 1952 DENTAL APTITUDE TESTING PROGRAM, and for application blanks to take the tests.

SPONSORED BY COUNCIL ON DENTAL EDUCATION OF THE AMERICAN DENTAL ASSOCIATION

DENTAL SCHOOLS

ALABAMA

School of Dentistry
University of Alabama
University Medical Center
Birmingham 5, Alabama

CALIFORNIA

School of Dentistry
College of Physicians and Surgeons
344 Fourteenth Street
San Francisco 3, California

College of Dentistry
University of California
The Medical Center
San Francisco 22, California

School of Dentistry
University of Southern California
635 W. Exposition Blvd.
Los Angeles 7, California

DIST. OF COLUMBIA

School of Dentistry
Georgetown University
3900 Reservoir Road, N.W.
Washington 7, D. C.

College of Dentistry
Howard University
5th and W. Streets, N.W.
Washington 1, D. C.

GEORGIA

School of Dentistry
Emory University
106 Forrest Avenue, N.E.
Atlanta 3, Georgia

ILLINOIS

Chicago College of Dental Surgery
Loyola University
1757 West Harrison Street
Chicago 12, Illinois

The Dental School
Northwestern University
311 East Chicago Avenue
Chicago 11, Illinois

College of Dentistry
University of Illinois
808 South Wood Street
Chicago 12, Illinois

INDIANA

School of Dentistry
Indiana University
1121 West Michigan Street
Indianapolis 2, Indiana

IOWA

College of Dentistry
The State University of Iowa
Iowa City, Iowa

KENTUCKY

School of Dentistry
University of Louisville
129 East Broadway
Louisville 2, Kentucky

LOUISIANA

School of Dentistry
Loyola University
6363 St. Charles Avenue
New Orleans 15, Louisiana

MARYLAND

Baltimore College of Dental Surgery
Dental School
University of Maryland
42 South Greene Street
Baltimore 1, Maryland

MASSACHUSETTS

Harvard School of Dental Medicine
25 Shattuck Street
Boston 15, Massachusetts

Tufts College Dental School
136 Harrison Avenue
Boston 11, Massachusetts

MICHIGAN

School of Dentistry
University of Detroit
630 East Jefferson Avenue
Detroit 26, Michigan

School of Dentistry
University of Michigan
Ann Arbor, Michigan

MINNESOTA

School of Dentistry
University of Minnesota
Washington Ave. and Union St., S.E.
Minneapolis 14, Minnesota

MISSOURI

Kansas City-Western Dental College
School of Dentistry
The University of Kansas City
Kansas City 6, Missouri

School of Dentistry
St. Louis University
3556 Caroline Street
St. Louis 4, Missouri

School of Dentistry
Washington University
4559 Scott Avenue
St. Louis 10, Missouri

NEBRASKA

School of Dentistry
The Creighton University
26th and California Streets
Omaha 2, Nebraska

College of Dentistry
University of Nebraska
Lincoln 8, Nebraska

NEW YORK

School of Dental and Oral Surgery
Columbia University
630 West 168th Street
New York 32, New York

College of Dentistry
New York University
209 East 23rd Street
New York 10, New York

School of Dentistry
University of Buffalo
25 Goodrich Street
Buffalo, New York

NORTH CAROLINA

School of Dentistry
The University of North Carolina
Chapel Hill, North Carolina

OHIO

College of Dentistry
The Ohio State University
Columbus 10, Ohio

School of Dentistry
Western Reserve University
Cleveland 6, Ohio

OREGON

Dental School
University of Oregon
Portland 14, Oregon

PENNSYLVANIA

School of Dentistry
Temple University
3223 North Broad Street
Philadelphia 40, Pennsylvania

PENNSYLVANIA (Cont'd)

Thomas W. Evans Museum and Dental Institute
School of Dentistry
University of Pennsylvania
4001 Spruce Street
Philadelphia 4, Pennsylvania

School of Dentistry
University of Pittsburgh
Thackeray and O'Hara Streets
Pittsburgh 13, Pennsylvania

TENNESSEE

School of Dentistry
Meharry Medical College
Nashville 8, Tennessee

College of Dentistry
University of Tennessee
Memphis 3, Tennessee

TEXAS

College of Dentistry
Baylor University
Dallas 1, Texas

School of Dentistry
University of Texas
Houston 4, Texas

VIRGINIA

School of Dentistry
Medical College of Virginia
Richmond 19, Virginia

WASHINGTON

School of Dentistry
University of Washington
Seattle 5, Washington

WISCONSIN

Dental School
Marquette University
604 North Sixteenth Street
Milwaukee 3, Wisconsin

SUPERIOR STEEL . . . SCALPEL SHARP!
For fastest, smoothest cutting, you'll get best results with Busch Burs . . . the bur that withstands wear and holds "scalpel-sharp" edges through long, long service. These blade sequences are engineered for cutting with a very minimum of pressure and vibration.
At best, dental drilling can never be termed a pleasant experience—but Dentists do find that Busch Burs are by far, the kindest to their patients.
We can only describe the action of smooth cutting but you'll appreciate it the very first time you use a Busch Bur. Order a supply through your own depot—you'll be glad you've tried them. ★ ★ ★ ★ ★
BUSCH BURS
PFINGST & COMPANY, INC.
62 COOPER SQUARE • NEW YORK 3, N.Y.
BUSCH BURS • NORICO DIAMOND ABRASIVES • AJUSTO HAND PIECES • STAINLESS INSTRUMENTS

The Porcelain Tooth Of Greater Strength

You do not have to put up with excessive breakage in modern transparent enamel teeth! If you are one of many having undue breakage, then switch to the original of all transparent enamel teeth — Myerson's True-Blend — more beautiful and stronger than any of its imitators, stronger even than the old opaque type of tooth.

Read what these dentists and laboratories say, based on their actual experience with Myerson's teeth.

From a Boston dentist . . .
who has been wearing Myerson's True-Blend in his own mouth since 1940; "I have remade the case several times but always use the same teeth. I've had no breakage. Personally we use Myerson teeth exclusively in my office because they are stronger and more beautiful."

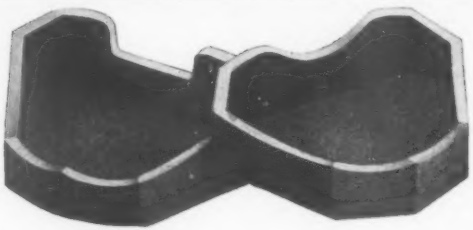
From a New Jersey Laboratory . . .
"From the technician's angle — I have very little breakage with Myerson's teeth."

From a dental clinic in Chicago . . .
"Everyone in the circle agreed with me 100%. They had far less checked teeth trouble with Myerson's than with any others."

These and many other testimonials are from actual letters in our files.

Myerson's TRUE-BLEND

MYERSON TOOTH CORPORATION
Cambridge 39, Massachusetts, U.S.A.



By Popular Demand

JUMBO-SIZED COLUMBIA RUBBER MODEL FORMERS

Make Neat Bases on Study and Work Models

per Set—1 Upper and 1 Lower
No. R1X—Jumbo-Size....$4.00

Other Sizes Available

No. R1—Large..... 3.50
No. R2—Medium..... 3.50
No. R3—Small..... 3.00

These Extra Large Model Formers speed up making symmetrical bases for study and work models of extra large impressions. They eliminate boxing-up, fussing and trimming. Just the thing for models of alginate impressions, which run notoriously large. Base comes out of the flexible rubber former smooth, symmetrical, and perfectly finished.

Complete instructions with every set.

COLUMBIA DENTOFORM CORPORATION

"The House of A Thousand Models"—also Headquarters for Brown Precision Attachments
131 EAST 23rd STREET [Have You a Copy of Catalog No. 33?] NEW YORK 10, N. Y.

A Good Alloy Need Not Be Expensive

Meets with A.D.A. Specifications — CHECK THESE PRICES

• Start now to use this tested, accepted alloy that has been used by leading West Coast Dentists for over 18 years. Speyer's Alloy is carefully made from C.P. metals. You will find it amalgamates smoothly, in minimum time, carves exceptionally well in ten minutes and produces a hard, well-sealed mass that polishes beautifully.

- 68½% silver.
- No initial contraction.
- 4.4 microns per Cm expansion in 24 hours.
- 1.6% flow 24 hours after amalgamation.
- Complete directions with every bottle.

A Star Performer in the Alloy Field

1 oz.	@	$1.90 per oz.
5 ozs.	@	1.70 per oz.
10 ozs.	@	1.60 per oz.
20 ozs.	@	1.50 per oz.
30 ozs.	@	1.40 per oz.
50 ozs.	@	1.30 per oz.

I enclose check for .....

If your dealer can't supply you, order direct.

SPEYER SMELTING & REFINING CO.
216 MEDICAL & DENTAL BUILDING
SEATTLE 1, WASH.

Dr. .....
Address .....
City ..... State .....

AUREOMYCIN

Lederle

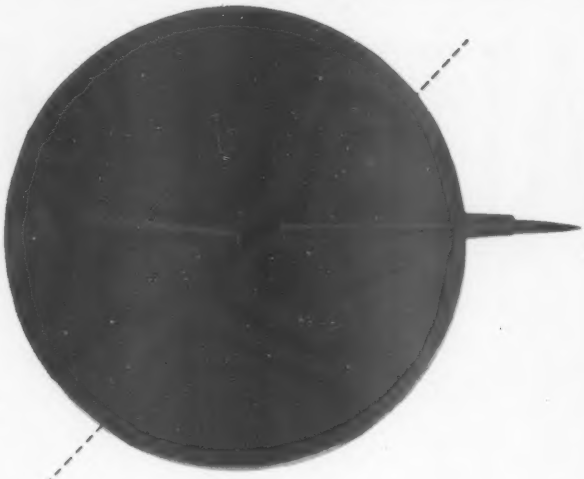
The greatest hazard consequent upon oral surgery is infection. This may take the form of rapid extension into contiguous structures, or invasion of the blood stream. Aureomycin is an ideal antibiotic for the prevention of both, and aids prompt tissue repair to the extent that it prevents infection. Aureomycin is now available in several forms adapted to use by the dental profession, including capsules, soluble tablets, dental cones, and dental paste.

Aureomycin may be used as an adjunct for the prevention or treatment of bacterial infections commonly encountered in dental surgery, including necrotizing gingivitis, pericoronitis, acutely infected pulp, acute abscess, periodontal pocket, and periapical abscess, as well as for the prevention of infections following extractions. The tablets may be used locally by direct application to the affected area as a cone or in a solution. Cones may be used whole or crushed. Paste should be formed to suit the cavity and applied directly. In severe infections, it is necessary to support local therapy by the oral administration of aureomycin capsules.

Aureomycin dental products are available through pharmacists.

Dental Cones: *Tubes of 12.*
Dental Paste: *30 mg. per Gm. - Jars of 5 Gm.*
Soluble Tablets: *50 mg. - Tubes of 40 and bottles of 100.*

LEDERLE LABORATORIES DIVISION AMERICAN CYANAMID COMPANY 30 Rockefeller Plaza, New York 20, N. Y.



this *brush* **is a professional instrument**

the NON-PRESSURE *"brush on"* TECHNIC

brings new efficiency to resins...
and Caulk offers professional
"Brush On" instruments

In the Kadon Application Kit you have precision instruments, obviously professional in character, for applying Kadon by the "Brush On" technic. The tapering shank of each handle is slotted for easy and secure attachment in the ferrules of the brushes. These specialized instruments, together with Kadon's remarkable adaptability to the "Brush On" technic, make the placing of resin restorations more efficient than ever before.

the KADON APPLICATION KIT

Flint glass dispensing tray
Six detachable brushes (3 small, 3 medium)
Two aluminum handles

$4.75

WHATEVER YOUR PREFERENCE IN TECHNIC... **NON-PRESSURE, CONVENTIONAL** or **INLAY**...

KADON BRINGS YOU THE WIDEST RANGE OF LIFELIKE COLORS FOR QUICK, EFFICIENT TOOTH MATCHING.

THE RESTORATIVE RESIN OF CHOICE IS

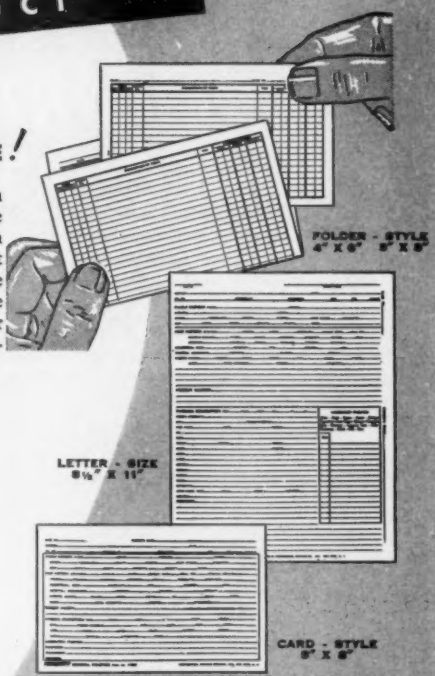
Caulk KADON

Another

HISTACOUNT® PRODUCT

RECORD FORMS FOR EVERY PRACTICE!

There is a "Histacount" record form for practically every branch of the medical profession. Available in three styles—each illustrated at right: the popular folder-style, the new letter-size and the old favorite card-style. Each serves a particular need... all are complete, economical and technically correct.



NOW USED BY THOUSANDS OF DOCTORS

"Histacount" forms have widespread popularity and acceptance. More doctors use these fine forms than any other to maintain complete and accurate case histories and account records.

COMPLETE OFFICE SUPPLIES

There are many other fine "Histacount" products: stationery, files of all sizes, guides, bookkeeping systems, collection aids and numerous other items manufactured exclusively for the professions. Sold through the mails to save you time and money!

ACTUAL SAMPLES ON REQUEST

ATTACH THIS COUPON TO YOUR LETTERHEAD OR RX BLANK

PROFESSIONAL PRINTING COMPANY, INC.
202-208 TILLARY STREET BROOKLYN 1, N. Y.

Gentlemen: Send literature and samples of "Histacount" Record Forms. 6-2-2

My specialty is: _____

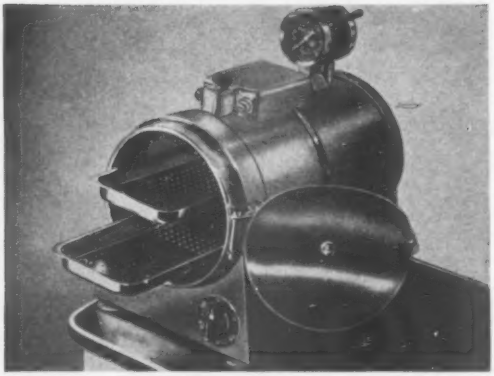
Also send literature on the items that are checked at right...

- ☐ Stationery Products
- ☐ Bookkeeping Systems
- ☐ Files & Filing Supplies

America's Largest Printers to the Professions

RAPID onset...
COMFORTABLE tolerance...
ADEQUATE anesthesia...
for prolonged procedures or relief of post-operative discomfort following surgery
Order a supply of Novocain-Pontocaine-Cobefrin today and you'll see why
"the Difference is Distinctive"

npc
REMEMBER — do not confuse rapid injection with speed of anesthesia. Inject slowly and gently for best results.
COOK-WAITE Laboratories, Inc.
1450 BROADWAY, NEW YORK 18, N. Y.
Cobefrin, Neosynephrin, Pontocaine — Trademarks Reg. U.S. Pat. Off. and Canada, Winthrop-Stearns Inc.



WHENEVER YOU ENTER THE BLOODSTREAM

*. . . you need autoclave sterilization**

Injections, blood sampling, or endodontia . . . if the bloodstream is entered, autoclave sterilization is a necessity.*

Boiling disinfects—kills bacteria but does not get spore-bearers and viruses! Castle's new stainless steel "777" Speed-Clave sterilizes at temperatures of 250°F. and 15 lbs. pressure—gets all organisms—gives your patients complete safety!

Heats to sterilization temperatures in record 7 minutes from a cold start (and in *3 minutes* when warm!). When sterilization is accomplished, shuts off automatically—no waste of current. *Simple! No valves to turn.*

Saves your instruments—less rust and dulling—saves 40% of dressing costs by letting you sterilize them DRY, ready for use . . . in the "777."

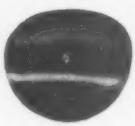
Costs but a fraction as much as ordinary autoclave . . . no more than cabinet boilers. Call your dealer, or drop a card to: Wilmot Castle Co., 1104 University Ave., Rochester 7, N. Y.

**Bibliography on request.*

CASTLE "SPRING-SEAL" DOOR

Only Castle has it!

Secret of the "777" Speed-Clave success! Special patented door gives long life and highest safety—makes autoclave low in weight and cost . . . high in speed.



Castle

LIGHTS and STERILIZERS

Inspection insures perfection in Ash BURS, too!

It may seem incredible, but it's a fact — *every* Ash Bur you buy has been:

- ***INDIVIDUALLY gauged . . .***
- ***INDIVIDUALLY inspected . . .***
- ***INDIVIDUALLY tested for temper . . .***
- ***INDIVIDUALLY tested for true running . . .***

and every batch is subjected to the most rigorous tests by highly skilled metallurgists using the latest scientific equipment in the world's largest bur plant.

This is why Ash Burs have gained, and held, world-wide acceptance as the sharpest, smoothest-running and most durable dental burs made anywhere.

Ash Burs are produced in the widest variety of shapes and sizes — Tapered Shank, Miniature and Regular. Order a supply from your dealer today. Remember — your skill deserves the finest!

Claudius Ash, Sons & Co., U.S.A., Inc.

ONE OF THE AMALGAMATED DENTAL GROUP OF COMPANIES

127-131 Coit Street Irvington 11, N. J.

THE NAME "ASH" HAS IDENTIFIED FINE DENTAL PRODUCTS FOR OVER 130 YEARS.

New! YEAR BOOK OF DENTISTRY

Edited by Tylman, Keys, Knutson, Moore, Robinson and Waldron

WHAT vitamin may have to be considered during oral aureomycin therapy? HOW MUCH may the teeth be involved in hyperparathyroidism? HOW CAN porosity of acrylic denture base materials be virtually eliminated? TEETH MAY be removed in the presence of acute infection if what two requirements are met?

These are but a few of the *hundreds of questions* pertaining to treatment of caries, handling of children's teeth, new technics in orthodontia, oral pathology, new dental materials and equipment, advances in making and fitting prostheses, and new and improved oral surgery technics that are answered for you in the **new—just published—1951 Year Book of Dentistry.** This is a *new* book, cover to cover, *not* a revision. With its many evaluations and interpretations by the distinguished editors, it is the only book of its kind in the dental field—the choice of thousands of dental practitioners and specialists who depend on it year after year to keep them completely briefed on every worthwhile advance in world dental practice.

Edited by Stanley D. Tylman, D.D.S., Donald A. Keys, D.D.S., John W. Knutson, D.D.S., George R. Moore, D.D.S., Hamilton B. G. Robinson, D.D.S., and Carl W. Waldron, M.D., D.D.S. 528 pages, 334 illustrations. $5.00, postpaid.

Make Your Office a Cancer Detection Clinic!

SARNAT & SCHOUR'S ORAL & FACIAL CANCER

Prepare yourself *now* to safeguard patients from cancer! 40% of all cancers of the head, neck and oral cavity are seen first by the dentist, and this handy book (*a simplified, postgraduate course in early diagnosis and treatment*) will help you immeasurably in recognizing those that come to you.

Cancer is no respecter of age, sex, race or occupation; more children die of cancer than of infectious diseases—so take advantage of the assistance that can be yours through this valuable, easy-to-read book. Through picture and text, *every clinical consideration* is given to enable you to recognize—even suspect—cancer at its very beginning. This book is offered on a *10-day approval basis;* so why not see its many features in your own office by checking and mailing the coupon below? Remember, a *missed diagnosis can be fatal!*

By Bernard G. Sarnat, M.D., F.A.C.S., and Isaac Schour, D.D.S., University of Illinois College of Dentistry. 304 pages; 236 illustrations on 118 figures; 12 color illustrations. $6.50, postpaid.

ORDER FORM

The Year Book Publishers, Inc., 200 E. Illinois St., Chicago 11, Ill.

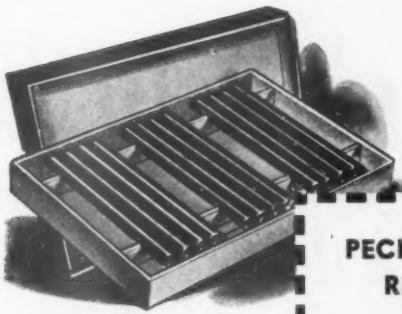
Please send me the following books, postpaid, for 10 days' free examination.

- ☐ New 1951 Year Book of Dentistry, $5.00.
- ☐ Sarnat & Schour's Oral & Facial Cancer, $6.50.

Name_____ Street_____

City_____ Zone____ State_____

JADA 2-52



TRY IT!

. . . you'll be more than pleased with results

PECK'S NEW DARK BLUE REGULAR INLAY WAX

A new member of this famous wax family. The double purpose inlay wax for direct or indirect technique. Complete instructions for direct technique in every box.

PECK'S DENTAL WAXES

(net weight over 1 oz. per doz. sticks)

PURPLE: Hard, inlay
PURPLE: Extra hard, inlay
NEW DARK BLUE REG.: inlay
MED. BLUE: inlay
WHITE: Hard, inlay
WHITE: Extra Hard, inlay
PINK: Sticky, setup rim

$1.00 per box

PECK'S PURPLE INLAY WAX
HARD also WHITE HARD GUARANTEED
to meet A.D.A. SPEC. #4

A. E. PECK MFG. CO. 1724 VENICE BOULEVARD LOS ANGELES 6, CALIF.

INSURANCE

FOR DENTISTS, PHYSICIANS, SURGEONS EXCLUSIVELY
Accident • Hospital • Sickness

ALL PREMIUMS COME FROM — PHYSICIANS SURGEONS DENTISTS — ALL BENEFITS GO TO

Cost has never exceeded amounts shown

$5,000.00 ACCIDENTAL DEATH $25.00 weekly indemnity, accident and sickness	**$8.00** Quarterly
$10,000.00 ACCIDENTAL DEATH $50.00 weekly indemnity, accident and sickness	**$16.00** Quarterly
$15,000.00 ACCIDENTAL DEATH $75.00 weekly indemnity, accident and sickness	**$24.00** Quarterly
$20,000.00 ACCIDENTAL DEATH $100.00 weekly indemnity, accident and sickness	**$32.00** Quarterly

Also hospital expense for members, wives and children at small additional cost

85c out of each $1.00 gross income used for members' benefit

$4,000,000.00
INVESTED ASSETS

$17,800,000.00
PAID FOR CLAIMS

$200,000.00 deposited with State of Nebraska for protection of our members

Disability need not be incurred in line of duty—benefits from the beginning day of disability

PHYSICIANS CASUALTY ASSOCIATION
PHYSICIANS HEALTH ASSOCIATION

49 years under the same management

400 FIRST NATIONAL BANK BUILDING — OMAHA 2, NEBRASKA

Now... Stop Testing Tooth Vitality with *ELECTRIC S-H-O-C-K*

Replace that OBSOLETE "Pulp Tester" on Your Unit with . . BURTON RADIONIC *New* HIGH FREQUENCY VITALOMETER

No. 205
High Frequency Vitalometer Set only $65.00
No. 287
Complete Diagnostic Set, including the Vitalometer only $85.50

Just as radar has replaced age-old methods of detection for the safety of modern nations – so too Burton *new Radionic* HIGH FREQUENCY VITALOMETER has outmoded the old "electric-shocking pulp tester" on your dental unit, or other so-called "pulp testers" you may be using. So play *safe* Doctor...replace obsolete "electric-shocking" machines with this newest modality that's sure, safe and accurate every time. Can be installed in all modern dental units. See the Burton VITALOMETER and other modern diagnostic, operative and examining aids at your dealer today.

FREE TO DENTISTS! Send for Burton Educational Treatises. Sent FREE on request.

BURTON MANUFACTURING COMPANY
11201 W. PICO BLVD., LOS ANGELES 64, CALIF.

BURTON
PROFESSIONAL LIGHTING
SCIENTIFIC DEVICES

for the DOCTOR
• LABORATORY
• HOSPITAL ★

Fifty Years AND TOMORROW

DENTURES—Dentistry has come a long way since John Greenwood fashioned this denture for George Washington. It seriously affected facial contour, had poor retention, lacked esthetics and function—yet it represented *the best available* at that time. But dentistry made progress. By the end of the 19th century, new technics and the development of vulcanite and celluloid as denture base materials added considerably to the efficiency and appearance of dentures, even though they still left much to be desired.

It is only in the past fifty years that proper function and esthetics have been achieved—through new technics, improvements in impression materials, establishing of new tooth forms, and development of acrylic resins as denture base material.

Since 1902, BOOS Laboratories have kept pace with all new developments and today apply their fifty years of experience and skill to provide dentures which are *the best available.*

New and Outstanding
TINTED BASE DENTURES

BOOS is proud, in this anniversary year, to present dentists this newest development in dentures. No picture, even in full color, could do justice to their natural, life-like appearance.

For by a unique method, colors and shades of living tissues are reproduced on the labial, buccal, and palate. No two dentures are alike.

Write for full information and prices.

HENRY P. BOOS DENTAL LABORATORIES, INC.

808 NICOLLET AVE. • MINNEAPOLIS 2, MINN.

Branch Laboratories: Medical Arts Bldg., Duluth, Minnesota, Equitable Bldg., Des Moines, Iowa

THE ARISTALOY INDIVIDUAL BOTTLES DISPENSER SAVES YOU TIME AND MONEY. SUPPLIED FREE WITH 20 OZ. USERS CHEST.

THERE IS NO ALLOY LIKE ARISTALOY

It is sound practice to use your skill only with the finest, proven materials. This is particularly true in the case of amalgam fillings.

Aristaloy is the finest and most *scientifically correct* alloy available—*and results prove this!* It costs no more to use Aristaloy! Aristaloy fillings do not "raise" from the cavity . . . the surfaces stay clean and bright . . . It is so much nicer to work with. There's no other alloy anything like Aristaloy!

Insist upon Aristaloy! It is immediately available from your local reliable dealer, or write us.

ARISTALOY IS DEFINITELY NOT SOLD UNDER ANY OTHER LABEL.

Aristaloy

BAKER

BAKER & CO., INC.
850 PASSAIC AVE. · EAST NEWARK, NEW JERSEY

A TRADE MARK OF QUALITY

A Choice of Three

POSTURE COMFORT CHAIRS

MODEL 1050

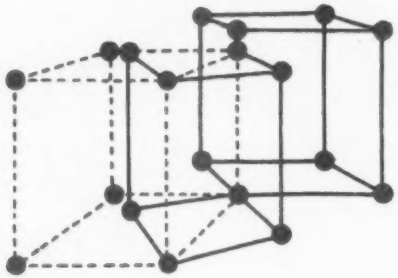
MODEL 1050A

Send for FREE Booklet

MODEL 135

The Model 1050 Posture Comfort Chair is a standard model used by the majority of dentists. Model 1050-A is the same as Model 1050 except that the saddle seat affords greater leg room comfort for the tall slender dentist — Supplied only on special order. Model 135 is the same as Model 1050 without the lateral body support. *Take your choice* — Select the model that suits you best. Now you can operate in the seated position with complete mobility . . . confidence and comfort. Order from your dealer today or write:

CHILDS MANUFACTURING COMPANY
Macon, Georgia



Ni + Co + Cr + Mo + Be + Mn + Cu =

TICONIUM

You are looking at the only one of its kind in the chrome field!

The chemical structure of that combination above produces beautiful dentures with tapered clasps and built-in strength; high, rich color that complements tissue; an amazing accuracy that satisfies the most exacting doctors.

All of these things are a part of TICONIUM because it is a fine-grain, low-heat chrome alloy—***the only one!***

Prescribe TICONIUM on your next case. It's SURE!

For new developments . . . look to **TICONIUM**
413 N. Pearl St., Albany, N. Y.

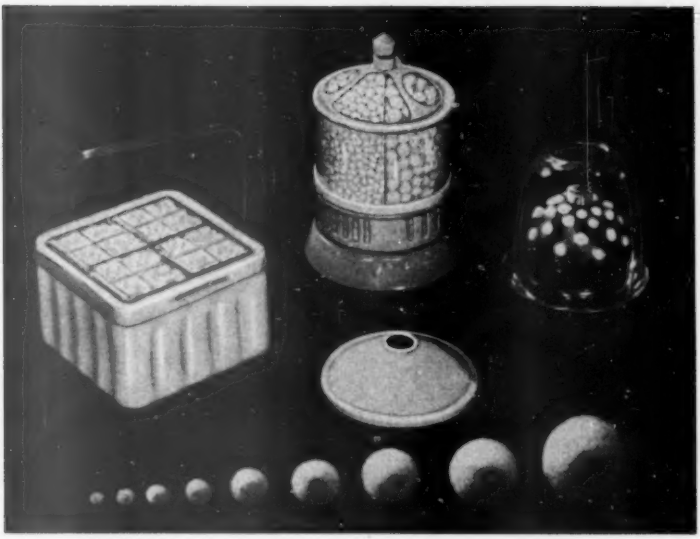
TICONIUM – 413 N. PEARL ST., ALBANY 1, N. Y.

PLEASE SEND ME DETAILED INFORMATION ON
THOMPSON TRU-RUGAE

DR. _____

STREET _____

CITY _____ ZONE _____ STATE _____



absorbent cotton pellets

In 9 Sizes from 1/8 In. to 1 In.

and pellet dispensers

Snow white, *absorbent* cotton pellets are a necessity on your bracket table. No need to pause, to free both hands, to change position every time you need a pellet.

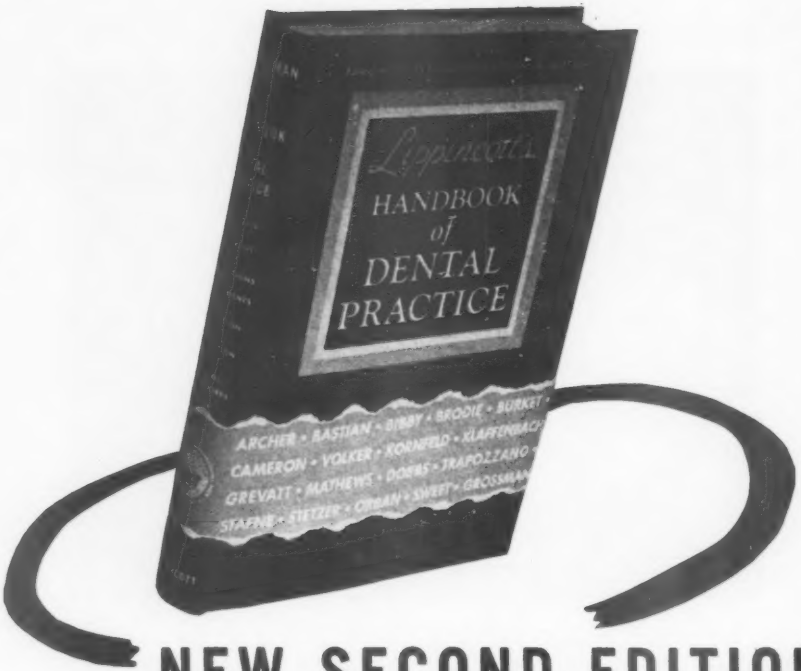
We've done the mechanical operations—have spun out and rolled up the finest absorbent cotton fibres into uniform balls, *not in 2 but in 9 different sizes from ⅛" to 1"*. Reach for just the size you wish during any operation; there's no loss of time when ready-rolled pellets of the right size are instantly at your tweezer tips.

As a further aid—we manufacture and supply (in 3 designs) small, convenient pellet dispensers which hold any four sizes of pellets—always handy, always ready for use.

Both pellets and dispensers are extremely economical and both will save time and temper. Ask your dealer for details or write directly to

RICHMOND DENTAL MFG. CO.
Box 2176 · Charlotte 1, N.C.

Standard with the Profession for over 50 Years



NEW SECOND EDITION

It fills a need—It is the only book devoted to all phases of dental practice. It is practical—It describes techniques of practice clearly and in detail. It contains many illustrations which, with the text, tell how to do it. It is a complete post-graduate course presented between the covers of a book. 12 subjects in color on 4 plates.

494 PAGES • 388 ILLUSTRATIONS • $12.00

J. B. LIPPINCOTT COMPANY
E. WASHINGTON SQUARE
PHILADELPHIA 5, PA.

Please send me: ☐ Grossman, HANDBOOK OF DENTAL PRACTICE, 2nd Edition $12.00

☐ Cash enclosed ☐ Charge my account

NAME _____

ADDRESS _____

CITY, ZONE, STATE _____

CDX

a dental x-ray unit you'll never wear out

According to our records we have no report of a CDX ever wearing out. High praise, but there's more to the story: From the first CDX to the current model, the principle of complete *oil immersion* has been employed. This means a smaller head size for easy maneuverability and more efficient cooling for longer life. There's 100% electrical protection, too, plus top performance—top styling. Consider all of this when buying a dental x-ray unit. Ask your dealer for details or write X-Ray Dept., General Electric Company, Milwaukee 14, Wis., Room JJ2.

GENERAL ELECTRIC

"I like my VITAL

Improved natural appearance was the reward for this patient who wears a Vitallium appliance to replace six upper anteriors and a bicuspid, which were malposed and malformed and marred her smile.

® By Austenal Laboratories, Inc.

AUSTENAL

THERE IS A VITALLIUM

LIUM PARTIAL"

VITALLIUM®

PRESCRIBE...

VITALLIUM PARTIALS

FOR GREATER PATIENT SATISFACTION
AND TO ENRICH YOUR PRACTICE

LABORATORIES, INC.

NEW YORK CHICAGO

LABORATORY NEAR YOU

The makers of SILVERLOY, upon the occasion of its 50th year of service to dentistry, pause with just pride to salute the many thousands of users of this time proven product.

We have come a long way together during the half century. And with you we agree that a properly made amalgam restoration still has NO superior. From every standpoint it offers *"so much for so little."*

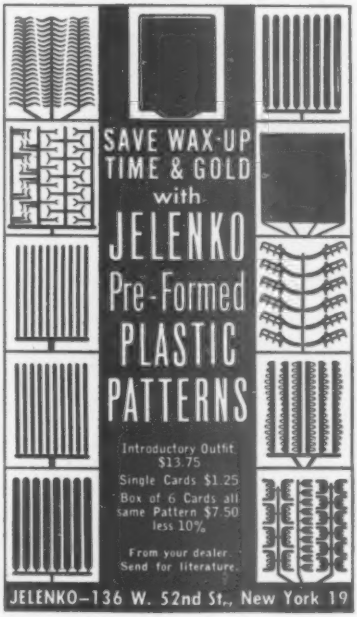
For your confidence we say, "Thanks." Your loyalty and cooperation will continue to guide us in making SILVERLOY the best possible silver alloy.

Order from your dealer

OR DIRECT FROM

CRESCENT DENTAL MFG. CO.

1839 S. Pulaski Rd., Chicago 23, Ill.



THE
MEDICAL
PROTECTIVE
COMPANY
FORT WAYNE,
INDIANA

PROFESSIONAL PROTECTION EXCLUSIVELY SINCE 1899

specialized service assures *"know-how"*

Our hands uphold the highest standards of quality in a denture adhesive; and our hearts the highest ideals of faithful service to the dental profession.

CO-RE-GA

CO-RE-GA IS NOT ADVERTISED TO THE PUBLIC

Accepted
COUNCIL ON DENTAL THERAPEUTICS
AMERICAN DENTAL ASSOCIATION

Mail this coupon for your supply of professional samples

Dr. _____
PLEASE PRINT

Address _____

City _____ State _____

22-B

CO-RE-GA CHEMICAL CO. • 76 Mill Road, Jersey City 6, N. J.

DENTA PEARL

. . . from the 5G *(Giant)*
(9.4 mm wide and 13.0 mm long)

to the 1T *(Tiny)* . . .
(6.9 mm wide and 7.8 mm long)

Denta Pearls offer you the

LARGEST MOLD RANGE

plus

Solvent Resistance with Dependable Retention

JUSTI

Products for Better Dentistry

H. D. JUSTI & SON, INC. • PHILA. 4, PA.

SAVES AT LEAST 1/3 CHAIR TIME . . . ALLEVIATES PAIN

THERM · Ex SPRAY

REG. U. S. PAT. OFF.

by . . . directing its fine atomized, water spray upon bur, diamond and other abrasive instruments.

to . . . abolish frictional heat . . . remove debris from cavity . . . avoid thermal shock . . . eliminate anesthetic in many instances . . . provide clear visibility . . . divert patient's attention.

OPERATED BY PATIENT

Therm · Ex Atomizer fits your spray bottle, and is connected by rubber tubing to spray attachments. Patient presses air cut-off when feeling pain or upon your direction.

OPERATED BY DUAL CONTROL

Equipment becomes integral part of your unit. Synchronized with your engine, spray starts and stops only with foot controller. You may create spray independently of patient, or patient may participate by pressing his hand-switch, or spray may be completely shut off.

Does not flood mouth — saliva ejector unnecessary. No debris ground into tooth structure. Prolongs efficiency of bur, diamond, stone, disc and other abrasives.

Spray attachments quickly snap on or off contra-angle or straight handpiece — are small and uncumbersome — do not interfere with your technique.

NOTE: Your Therm · Ex Spray may be converted to Dual Control in a matter of minutes by ordering necessary accessories.

**Full information and illustrated literature from your dealer or by writing Hanau.*

HANAU ENGINEERING COMPANY, INC.

1233 MAIN STREET BUFFALO 8, N. Y.

Bring Sunshine into Your Office

DURING THESE DARK DAYS WITH A

Ritter FUL-VUE LIGHT

CONSTANT DAYLIGHT IN YOUR OPERATING ROOM

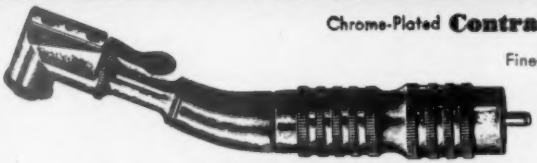
With the soft, diffused light of the circline fluorescent tubes, your patients are able to view their restorations in a true light. Your skill receives greater appreciation. In this light you are better able to match teeth. And, you enjoy greater ease and comfort working in good daylight conditions.

COMPLETE ORAL CAVITY ILLUMINATION

The color-corrected light forms an even rectangle to completely illuminate the oral cavity. With far less eye fatigue, you see more clearly the intra-oral field of operation. The concentrated beam produces a clear, white light free from glare, free from excessive heat. The operating spot framed by a halo of fluorescent light gives greater patient comfort.

Prices Drastically Reduced!

FOR 30 DAYS ONLY! ORDER AT ONCE



Chrome-Plated **Contra Angle Doriot**

Finest quality — IMPORTED

$4.95

Present selling price in Dental Depots $10.00—ONLY ONE TO A CUSTOMER

Imported Chrome Plated, Doriot Hand Piece		$14.50
100 "STANDARD" Anesthetic TUBES—(Accepted A.D.A.) (Formulas 2A and 1AB)		3.95
Chrome Plated, U.S.A. Make, Right Angle for Doriot		5.95
Chrome Plated, U.S.A. Make, Contra Angle for Doriot		9.95
Chrome Plated, U.S.A. Make, Doriot Hand Piece		19.45
12 GUARANTEED BOILABLE MIRRORS (Sizes 4-5-6 Plain or Mag.)		3.50
IMPORTED BURS Round or Inverted Cone	Gross	7.25
IMPORTED BURS Cross Cut Fissure	Gross	9.45
IMPORTED FORCEPS (Chrome-Plated) (Numbers 15, 16, 18L, 18R, 32, 53L, 53R, 65, 69, 85, 88L, 88R, 150, 151)	Each	2.45
Diamond Instruments—Nos. 1-2-7-18-25-26-32-35-75-76-87	Each	1.75
5 ozs. STANDARD ALLOY (69% Silver, 25% Tin, 5% Copper, 1% Zinc) A.D.A. Accepted		7.50
100 Assorted Copper Bands (½" x 36G) 20 Sizes in box		1.75
24 Steel MANDRELS for Hand Piece $1.50 24 For Right Angle		2.00
6 Assorted VULCANITE BURS (Round, Bud, Pear, Egg)		1.75
2 Jars Floss in Glass Containers (150 Yards)		1.25
12 Carborundum Mounted Points (Assorted)		1.25
2 Chrome Plated Clogless Saliva Ejectors		1.25
2 Dozen Steel Disks (⅜"-¾"-⅞") or Steel Strips		1.00
1 Bottle Surface Anesthetic (A.D.A. Accepted)		1.00
6 Dozen Broaches		1.50
200 No. 2 Record Cards, Size 4" x 6"		1.00
1 Amalgam Carrier (Chrome-Plated)		1.00
4 Stainless Steel P. W. Explorers (3-6-17-23)		1.00
6 Boxes Celluloid Strips		1.00
5 Boxes Temporary Stopping		1.00
2 Boxes Linen Strips		1.00
Box of S. S. White Porcelain, Shades 20-23-24-25-27-28		1.00
30 Assorted Heatless Wheels (Sizes 4 to 12)		1.00
20 Books Articulating Paper		1.00
50 Assorted Pumice Rubber Cleaning & Polishing Wheels—Cups		1.00
4 Assorted Dappin Dishes (Amber, Blue, Green, Clear)		1.00
3 Engine Belts		1.00

TERMS: Check with order—or C.O.D. (C.O.D. Fees extra)
Parcel Post Prepaid—TO YOUR OFFICE
Include Business Card or Letter Head with order

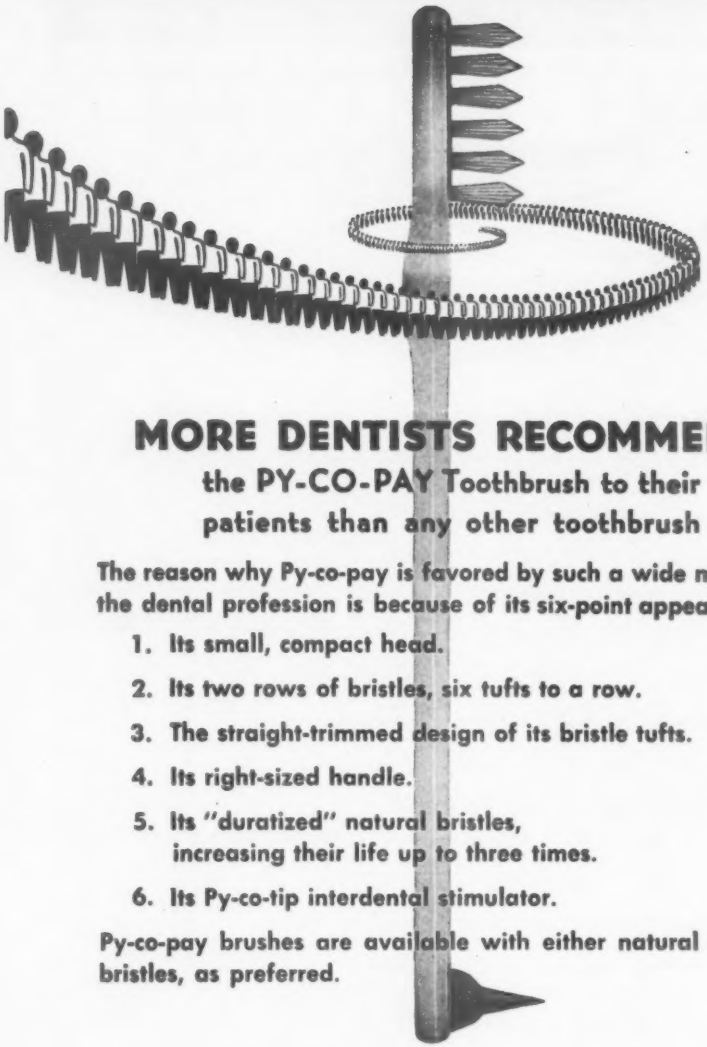
FREE!—Gent's Leather Billfold—with $10.00 order—FREE!

HURRY if you want any of these SENSATIONAL VALUES
MAIL YOUR ORDER AT ONCE—BEFORE IT IS TOO LATE

STANDARD DENTAL PRODUCTS CO.

908 Chestnut St. **Philadelphia 7, Pa.**

ABSOLUTE SATISFACTION or YOUR MONEY BACK



MORE DENTISTS RECOMMEND

the PY-CO-PAY Toothbrush to their patients than any other toothbrush

The reason why Py-co-pay is favored by such a wide margin of the dental profession is because of its six-point appeal:

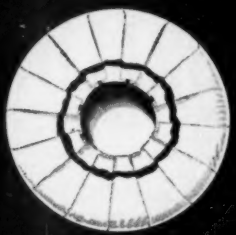
1. **Its small, compact head.**
2. **Its two rows of bristles, six tufts to a row.**
3. **The straight-trimmed design of its bristle tufts.**
4. **Its right-sized handle.**
5. **Its "duratized" natural bristles, increasing their life up to three times.**
6. **Its Py-co-tip interdental stimulator.**

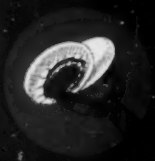
Py-co-pay brushes are available with either natural or nylon bristles, as preferred.

Py-co-pay

TOOTH BRUSHES AND TOOTH POWDER

PYCOPÉ, INC. • JERSEY CITY 2, N. J.





Sanitary Headrest Covers
to personalize your dental chair

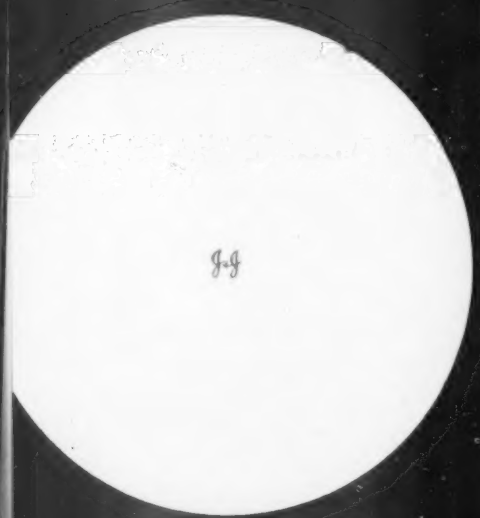
Practical and individual, Johnson & Johnson Headrest Covers protect both patient and headrest pad. These moisture-resistant covers are disposable — they provide fresh protection for each patient. Order them in boxes of 500, or 100; your patients will appreciate your thoughtfulness.

efficacy and elegance in dental technique

Dental Bracket Covers
to enhance your chair-side table

Johnson & Johnson Dental Bracket Covers lend an immaculate, efficient air to your bracket table. They speed table clearance and thereby reduce to a minimum time lost between patients. Their high quality, heavy paper silences clattering instruments. Available in two diameters: 13½" in boxes of 500's and 100's, and 13 1/16 in boxes of 100's only.

Dental Division



S·S·White
ORALINE
MOUTH WASH

Marvelous New Plastic Bottle

CONVENIENT
ONE-HAND OPERATION.
JUST LIFT CAP, TILT,
SQUEEZE.
NON-BREAKABLE,
SPACE-SAVING.

NO WASTE. CAN'T CLOG
SPRAY-BOTTLE MECHANISM.

Contains 8 oz., makes 2 gals. of solution. Non-astringent in action, delightfully flavored! Order from your salesman.

The S. S. WHITE DENTAL MFG. CO.
211 So. 12th St., Phila. 5, Pa.

FREE! Prescription-Blank Pads. Write on Professional Letterhead.

The Gentle Way to
S-P-R-E-A-D
CROWDED TEETH
BURLEW
READY-CUT
WEDGES
PATENTED

Separate teeth for cavity preparation, filling and for interproximal cleaning.

Complete Outfit $1.15
About 100 Ready-Cut Celluloid Wedges in assorted sizes — 2 Separating Discs — 1 Wedge Setter.

Sold by Better Dealers
J. F. JELENKO & CO., Inc.
136 W. 52nd St., New York, U.S.A.

Close-Up of Teeth Taken With Exakta "VX"

For Parallax-Free Dental Photography

New Model With Pre-Set Diaphragm

1952 EXAKTA—MODEL VX
35-mm. Single Lens Reflex Camera

For photographing conditions before and after treatment, cavities, inlays and bridgework, and for recording and for demonstrating oral treatment to patients. The indispensable aid of the progressive dentist! With f2.8 Zeiss Tessar "T" Coated Lens with $269.50
Pre-Set Diaphragm Control 50.00
Penta Prism Eye Level Reflex Viewfinder 24.00
Extension Tube Set 29.50
Microscope Adapter 29.50

FREE—Write Dept. 200 For Free Descriptive Booklet "C" on Camera & Accessories and Brochure On Close-Up Technique With Exakta.

EXAKTA CAMERA COMPANY
46 W. 29th St., New York 1, N. Y.

Exclusive Sales and Service Organization In U. S. A. For Ihagee Camera Works, Germany

Copyright 1951, Exakta Camera Company, Inc.

THE LONG AUGUST NIGHT WAS HOT—but not as hot as the bitter fighting that raged about Agok, Korea, in the Naktong River area. Sergeant Kouma, serving as tank commander, was covering the withdrawal of infantry units from the front. Discovering that his tank was the only obstacle in the path of an enemy breakthrough, Sergeant Kouma waged a furious nine-hour battle, running an eight-mile gantlet through enemy lines. He finally withdrew to friendly lines, but not until after his ammunition was exhausted and he had left 250 enemy dead behind him. Even then, although wounded twice, he attempted to resupply his tank and return to the fighting.

"A withdrawing action is not my idea of how Americans should fight," says Ernest Kouma. "If we must fight, let's be strong enough to take the offensive. In fact, *if we're strong enough*, we may not have to fight at all. Because, nowadays, *peace is for the strong.*

"So let's build our strength—let's build and build to keep a strong America at peace. That's where *you* come in. You can help by buying U. S. Defense Bonds. Buy as many Bonds as you think you can afford. Then buy some more. It's a far less painful sacrifice to build for peace than it is to destroy in war. And *peace* is what you're investing in when you buy Defense Bonds."

★ ★ ★

Remember that when you're buying bonds for national defense, you're also building a personal reserve of cash savings. Remember that if you don't save regularly, you generally don't save at all. So sign up in the Payroll Savings Plan where you work, or the Bond-A-Month Plan where you bank. For your country's security, and your own, buy Defense Bonds now!

Peace is for the strong... Buy U. S. Defense Bonds now!

M/Sgt. Ernest R. Kouma

Medal of Honor

The U. S. Government does not pay for this advertisement. It is donated by this publication in cooperation with the Advertising Council and the Magazine Publishers of America.

At any age

The Heart of Your Smile Is Your Teeth

KANSAS CITY, MO. March 195 9 No. 180

PAY TO THE ORDER OF ADA Dentist $150.00

One Hundred and Fifty 00/100 DOLLARS

BANK OF Reshdb Reserve Plan Inc

A superior plan for buying your patients' time-payment notes for dental care.

Reserve Plan Inc

TRADE MARK

2

922 Walnut Street Kansas City 6, Missouri

For complete information without obligation mail this coupon TODAY!

Reserve Plan, Inc.
Suites 318-22, 922 Walnut Street, Kansas City 6, Mo.

Please send me your literature containing information on your plan for buying monthly payment notes, given for dental care.

NAME .....

ADDRESS .....

CITY ..... STATE .....

It's Still Today's Most Modern Cabinet Sterilizer

Two years ago Pelton introduced the revolutionary F-101 . . . the convertible oil or water cabinet sterilizer with the handy Storador and its four plastic trays. This Futuristic model is still today's best investment in modern asepsis. The handsome cabinet is also available with a 14 or 16-inch sterilizer for water only, either timer or automatic control. See it at your dealer's or write for literature.

PELTON

THE PELTON & CRANE CO., DETROIT 2, MICHIGAN

"...and don't forget the VITAMINS!"

Infections with attendant fever and anorexia increase the body's vitamin requirements. A balanced vitamin preparation is a dependable way to meet this need.

MERCK serves the Medical Profession through the Pharmaceutical Industry as a major manufacturer of Vitamins.

MERCK & CO., INC.
Manufacturing Chemists
RAHWAY, NEW JERSEY
In Canada: MERCK & CO. Limited—Montreal

NO NEED TO MUTTER A PRAYER AS YOU INSERT A *Replicast* PRECISION REMOVABLE

The uniformly accurate castings produced by the Dresch-developed REPLICAST technic have brought welcome relief from pre-insertion worries to hundreds of grateful dentists across the nation.

This uniform accuracy is the logical result of a casting procedure which eliminates the hazards of empirical methods, and leaves no detail to chance. Yet REPLICAST removables cost no more—frequently even less—than comparable cases produced in the traditional manner.

So take advantage of this superior service which assures you that each case will fit exactly as you intended it should. Discover for yourself why so many dentists are relying on REPLICAST precision removables to enhance the scope and prestige of their partial denture service. Mail the coupon or write today for price-list and full particulars.

REPLICAST ... A METHOD ... NOT A MATERIAL

The Dresch Laboratories Company
1009 Jackson Street—Toledo 1, Ohio

Tell me more about 'REPLICAST' precision removables.

DR._____

*Street Address*_____

*City—Zone—State*_____

J22

Now- DU PONT DENTAL

make your darkroom work

easier . . . reduce exposures . . . save time

Du Pont Dental Bitewing X-ray Film helps you solve interproximal radiographic problems. It facilitates recording on one film the coronal two-thirds of both the maxillary and mandibular teeth and produces radiographs of exceptional diagnostic value.

This means fewer exposures . . . fewer films used . . . less darkroom processing and better, faster work. You'll also like the wide exposure latitude of the film . . . its dependable uniformity . . . blue safety base and anti-abrasion emulsion.

Du Pont Dental Bitewing X-ray Film has the same speed characteristics as regular Du Pont double-coated Type D Periapical Dental X-ray Film No. 550.

It is packed in exclusive "Pull-A-Tab" packets that are easily positioned. The bite tab holds the film properly and securely for superior interproximal radiographs. Maximum comfort is assured by the flexibility and rounded corners of the packets. Saliva-proof envelopes protect the film at all times. Green tab on packet readily identifies tongue-side of the film . . . reduces risk of "lost exposures" and permits easy removal of the film for processing.

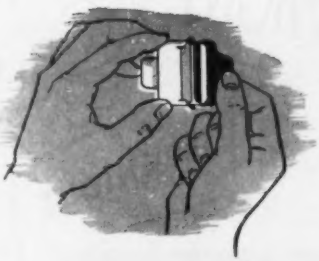
Exposures recommended with Bitewing X-ray Film at 10 milliamperes, 110 volts (approx. 65 Kv.P.) and an 8-inch anode-film distance:

Average adult . . . . 2—2½ seconds

Average child . . . . 1—1¼ seconds

BITEWING X-RAY FILM

in handy "Pull-A-Tab" packets



for better interproximal radiography

Rapid processing technique, permitting wet-film diagnosis in less than two minutes after exposure, can be applied by giving twice the foregoing exposure times. Develop one minute at 72°F. in Du Pont Concentrated Liquid X-ray Developer. Rinse 10 seconds. Immerse 20 to 30 seconds in Du Pont Concentrated Liquid X-ray Fixer. After wet-film diagnosis, complete fixation and wash film as usual.

Du Pont Dental Bitewing X-ray Film in No. 3 size (2⅛ x 1 1-16 inches) is available in packages of 24 "Pull-A-Tab" packets. Regular Du Pont Periapical Dental X-ray Film (1¼ x 1⅝ inches) is supplied in both single- and double-coated films packed one or two films to the packet, in packages of 24 and 144 packets. Ask your dealer for these dependable films and processing chemicals by name. E. I. du Pont de Nemours & Co. (Inc.), Photo Products Dept., Wilmington 98, Del.

"Pull-A-Tab" packets in No. 3 size now supplied with bite tab.

FOR A SUCCESSFUL DENTAL PRACTICE

Visualize yourself as the above harmonizers. You are trained in technique, but what about sound practice management?

You need both for success. You need technique PLUS sound, ethical business administration if you are to avoid discord.

For close practice harmony, learn about PBP — about sound practice management backed by many years of successful counsel for thousands of dentists.

LEARN HOW PBP PRACTICE HARMONY *PAYS AT LEAST* 5 WAYS

- MORE PRODUCTION
- MORE INCOME
- CONTROL OF ACCOUNTS
- IMPROVED GOOD WILL
- SIMPLIFIED MANAGEMENT

Without obligation, tell me about PBP practice harmony.

Dr. .....

Street .....

City ..... Zone..... State.....

MAIL TO PROFESSIONAL BUDGET PLAN 303 E. WILSON ST. MADISON 3, WIS

dp GOES TO THE SEA

for supremely accurate
FULL DENTURE IMPRESSIONS

D-P marine laboratory research assures CONSISTENT RESULTS — today, tomorrow, next year!

D-P THREE-IN-ONE CREAM

...mixes to a heavy creamy texture which flows and reproduces the most minute tissue detail. The material sets to a *very* firm but resilient body, permitting withdrawal over any undercuts.

OTHER ADVANTAGES

...non-burning, pleasant tasting ...clean, not messy...won't adhere to dry tissue... won't dehydrate tissue... has texture in finished impression identical to hydrocolloid.

Order both 3-in-1 "Regular" and "Thin" from your Dental Dealer NOW

DENTAL PERFECTION CO.
543 W. Arden Ave., Glendale 3, Calif.

THE 17TH EDITION . . .

ACCEPTED Dental Remedies

DO YOU KNOW:

Suitable conditions for disinfection of instruments?

Dental status of antibiotics and other anti-infectives?

Agencies responsible for drug standards?

Accepted commercial products?

Mechanics of prescription writing?

References to products not included in A.D.R.?

Provisions for acceptance of products?

This information appears in ACCEPTED DENTAL REMEDIES

Available NOW at only $1.50

ORDER DEPARTMENT, AMERICAN DENTAL ASSOCIATION
222 E. Superior St., Chicago 11, Illinois

Check the order you wish to place:

. . . . . Place my name on the standing order list to get ACCEPTED DENTAL REMEDIES regularly each year beginning with the 1952 edition. My check for $1.50 is enclosed for the 1952 edition.

. . . . . Just send me a copy of the 1952 book. . . . . My check for $1.50 is enclosed.

Signed . . . . . .

Address . . . . . .

. . . . . .
City Zone State

INDEX TO ADVERTISEMENTS

February 1952

Abbott Laboratories A-2
American Dental Assn. A-1, A-10, A-32, A-33, A-74
American Sterilizer Co. A-6
Ash, Claudius and Sons A-43
Astra Pharmaceutical Products, Inc. A-26, A-27
Austenal Laboratories A-54, A-55

Baker and Co. A-48
Boos Laboratories, Henry P. A-47
Bristol Myers Co. A-16, A-20
Burton Manufacturing Co. A-46

Castle Company, Wilmot A-42
Caulk Company, L. D. A-38
Childs Manufacturing Co. A-49
Classified Advertising A-17, A-18
Coe Laboratories A-8
Columbia Dentoform Corp. A-36
Columbus Dental Mfg. Co. A-21
Cook-Waite Laboratories A-40, A-41
Corega Chemical Co. A-57
Cosmos Dental Products, Inc. A-25
Crescent Dental Mfg. Co. A-56

Dental Absorbents Co. A-7
Dental Perfection Co. A-73
Dentists' Supply Co. of N. Y. ..... 2nd Cover, 4th Cover
Dresch Laboratories A-69
DuPont de Nemours and Co., E. I. A-70, A-71

Eastman Kodak Co. A-29
Exakta Camera Corp. A-64

Fleet Company, C. B. A-11

General Electric Co., X-Ray Dept. A-53

Hanau Engineering Co. A-59

Jelenko and Co., J. F. A-56, A-64
Johnson and Johnson A-63
Justi and Son, H. D. A-58

Lauer Metal Shop A-18
Lea and Febiger A-10
Lederle Laboratories A-37
Lippincott Co., J. B. A-52
Luxene, Inc. A-15

Medical Protective Co. A-56
Merck and Co., Inc. A-68
Mosby and Co., C. V. A-28
Myerson Tooth Corp. A-35

National Dairy Council A-24
Ney Co., J. M. A-9
Novocol Chemical Mfg. Co. A-4

Odontographic Mfg. Co. A-5

Peck Mfg. Company A-45
Pelton and Crane Co. A-67
Pfingst and Co. A-34
Physicians Casualty & Health Assn. A-45
Professional Budget Plan A-72
Professional Printing Co. A-39
Prophylactic Brush Co. A-12, A-13
Pycopé, Inc. A-62

Ransom & Randolph Co. A-14
Reserve Plan, Inc. A-66
Richmond Dental Mfg. Co. A-51
Ritter Company A-60

Smith & Son, Lee S. A-19
Speyer Smelting & Refining Co. A-36
Standard Dental Products Co. A-61

Ticonium A-50

Union Broach Co. A-7
United States Savings Bonds A-65

Weber Dental Manufacturing Co. A-3
Wernet Dental Mfg. Co. A-22, A-23
White Dental Mfg. Co., The S. S. A-30, A-31, A-64
Wiggin's Sons Co., H. B. A-7

Year Book Publishers, The A-44

you can't make a BIG horse out of a small pony

and experience and observation have shown that when teeth are, for purposes of sizing, reduced or enlarged, they lose much of the vitality that is characteristic of fine natural teeth in their original size.

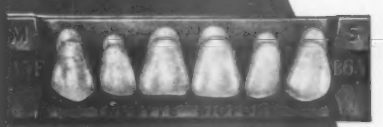
•

Contrary to the conventional system of sizing teeth, the small forms of **Trubyte Bioform Teeth** are not simply the reductions or enlargements of other forms.

NEW IN EVERY WAY

trubyte Bioform® teeth

the first "vacuum fired porcelain" teeth



Each form is a reproduction of six natural anteriors that have been selected for their size and proportions, appropriate outline and pleasing labial characteristics.

•

It is not easy for the most careful observer to distinguish the finest natural teeth from Trubyte Bioform Teeth.